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COPY

# Independent Forest Audit

## Armstrong Forest

### 2001-2006



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**ON THE COVER** Blue Flag Iris [*Iris versicolor*] growing on the Armstrong Forest.

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## 1.0 Executive Summary

This audit report, for the Armstrong Forest (the Forest), is the result of an Independent Forest Audit (IFA) conducted by KBM Forestry Consultants Inc., under contract to the Ontario Ministry of Natural Resources (MNR). All Crown forests in Ontario must undergo an IFA at least every five years. The requirement for independent audits arises from MNR's Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario (2003). Regulation 160/04 of the Crown Forest Sustainability Act sets out the specific requirements for conducting the audits.

The Armstrong Forest is located in MNR's Northwest Region within the Thunder Bay District. The audit covers the last four years of implementation of the 2000-2005 Forest Management Plan (FMP) as well as public participation, planning and implementation of the first year of the 2005-2010 FMP. The Armstrong Forest is managed under Sustainable Forest Licence (SFL) number 542255 held by Norampac Inc. (Norampac). Norampac is jointly owned by Domtar Inc. (Domtar) and Cascades Inc. Although Domtar manages the Forest under contract with Norampac, it is Norampac that is responsible for the SFL and therefore the audit findings are directed to Norampac.

The principal auditees are Norampac and the Ministry of Natural Resources Thunder Bay District (MNR). Other auditees include Overlapping Licensees, contractors and other branches of MNR to the extent that forest management activities carried out by them are the subject of audit examination.

The purpose of the IFA is to:

- Assess compliance with the Forest Management Planning Manual (FMPM) and the Crown Forest Sustainability Act (CFS);
- Assess compliance of forest activities with the FMPM and the CFS;
- Compare planned versus actual forest management activities;
- Assess the effectiveness of forest management activities in achieving audit criteria and management objectives;
- Assess the effectiveness of any action plans resulting from previous audits; and
- Assess a licensee's compliance with the terms and conditions of the SFL.

Based on the audit, 29 audit Recommendations were made. Recommendations can arise from audit team observations of material non-conformances, or may be developed to address situations in which the audit team identifies a significant lack of effectiveness in forest management activities.

Fourteen of the recommendations are directed to MNR, nine are given to Norampac and six address actions required by both MNR and Norampac. Twenty-six suggestions are given. Suggestions are less serious in nature and provide advice for improving particular aspects of forest management.

Although a considerable number of recommendations are directed to MNR, the majority (11 out of 14) deal with deficiencies in compliance with the public participation and planning process as detailed in the Forest Management Planning Manual, not implementation. This reflects the character of many of the protocols in the IFAPP.

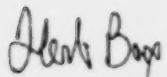
The recommendations that address deficiencies in planning will require the most attention. The audit team believes it is important to note that although plan implementation and monitoring is acceptable improvement is needed in several areas and Norampac needs to ensure staff have sufficient time in the field to monitor and assess operations.

A Best Practice was given to the MNR, Norampac, Buchanan Forest Products Ltd., Whitesand First Nation and Namaygoosisagagun for their efforts in increasing employment opportunities for Aboriginal community members on the Armstrong Forest. Continuing liaison with the Aboriginal communities is

required. A Best Practice was also assigned to the Planning Team in the development, application and continued refinement of the three-tiered management system.

The audit team notes that the long-term health and vigour of the Forest is being provided for by using forest practices within the limits of silvicultural requirements as per the CFSAs. As is common in other boreal forests, the level of harvest is forecast to decline for the next 30 years, due to an age-class "gap". The impact of this decline on social and economic values has not been quantified but is already a concern expressed by the Local Citizens Committee and Aboriginal communities. It will need to be addressed in future plans.

The audit team concludes that, with the exceptions noted in the audit report, management of the Armstrong Forest was in compliance with the legislation, regulations and policies that were in effect during the term of the audit, and the Armstrong Forest was managed in compliance with the terms of Sustainable Forest Licence Number 542255 held by Norampac Inc. Forest sustainability is being achieved as assessed through the Independent Forest Audit Process and Protocol.



Herb Bax, R.P.F., CF/CFA, CEA (SFM), EMS (LA)  
Lead Auditor, on behalf of the Audit Team

## 2.0 Introduction

This audit report presents the results of the Independent Forest Audit (IFA) conducted by KBM Forestry Consultants Inc. (KBM) on the Armstrong Forest (the Forest) for the five-year period from April 1, 2001 to March 31, 2006. The audit covers the last four years of implementation of the 2000-2005 Forest Management Plan (FMP) as well as public participation, planning and implementation of the first year of the 2005-2010 FMP. The Armstrong Forest is managed under Sustainable Forest Licence (SFL) number 542255 held by Norampac Inc. (Norampac). Norampac is jointly owned by Domtar Inc. (Domtar) and Cascades Inc. Although Domtar manages the Forest under contract with Norampac, it is Norampac that is responsible for the SFL and therefore the audit findings are directed to Norampac.

Throughout this audit report "the Company" refers to Norampac, while "Forest" refers to the Armstrong Forest. The principal auditees are Norampac and the Ministry of Natural Resources Thunder Bay District (MNR). Other auditees include Overlapping Licensees, contractors and other branches of MNR to the extent that forest management activities carried out by them are the subject of audit examination.

### 2.1 Audit Process

#### 2.1.1 Purpose

The Independent Forest Audit Process and Protocol<sup>1</sup> (IFAPP) was developed by the Ministry of Natural Resources Forest Management Branch to provide a comprehensive and consistent method of evaluating forest management activities on Crown land. The IFAPP states that the purpose of an Independent Forest Audit is to:

- Assess to what extent forest management planning activities comply with either the 1996 Forest Management Planning Manual<sup>2</sup> (FMPM) or the 2004 FMPM<sup>3</sup>;
- Assess to what extent forest management activities comply with the Crown Forest Sustainability Act<sup>4</sup> (C CSA) and with the forest management plan(s), the manuals approved under the C CSA and the applicable guides;
- Compare planned versus actual forest management activities;
- Assess the effectiveness of forest management activities in meeting forest management objectives set out in the relevant forest management plan, as measured in relation to the criteria established for the audit;
- Assess the effectiveness of any action plans implemented to remedy shortcomings as identified by previous audits; and
- Review and assess a licensee's compliance with the terms and conditions of the SFL.

#### 2.1.2 Audit Process Overview

The IFAPP contains 152 criteria and 403 procedures, of which 330 apply to the Armstrong Forest audit. The audit procedures serve as a framework to provide a structured approach to evaluating whether or not forest management activities meet the requirements governing forestry practices on Crown land in Ontario.

The previous IFA conducted on the Forest was undertaken in 2001<sup>5</sup>. The implementation of actions to address the recommendations contained in the previous audit was examined during the course of this audit (see Section 3.8).

<sup>1</sup> MNR. 2006. Independent Forest Audit Process and Protocol. Copyright © Queens Printer, 26 pp. + Appendices.

<sup>2</sup> MNR. 1996. Forest Management Planning Manual for Ontario's Crown Forests. Queen's Printer for Ontario. 452 pp.

<sup>3</sup> MNR. 2004. Forest Management Planning Manual for Ontario's Crown Forests. Queen's Printer for Ontario.

<sup>4</sup> Crown Forest Sustainability Act. S.O. 1994 c. 25.

<sup>5</sup> Callaghan & Associates Inc. 2001. An Independent Audit of Forest Management on the Armstrong Forest for the Period 1995-2001. 49 pp. + Appendices.

The audit process for the Armstrong Forest consisted of six components:

1. Audit Plan<sup>6</sup>: KBM prepared an audit plan that described the schedule of audit activities, audit team members and participants, and auditing methods. The plan was submitted to MNR, Norampac, the Forestry Futures Committee (FFC), and the Chair of the Armstrong Forest Local Citizens Committee (LCC).
2. Public Survey: KBM prepared a one-page public survey that was distributed to all organizations and to a randomly selected sample of one-third of the individuals listed in the 2005-2010 Armstrong Forest FMP mailing list provided by MNR. This random sample included Overlapping Licensees, contractors, commitment holders, tourist operators, Aboriginal community representatives and members of the LCC. The public survey was also mailed to individuals who were former members of the LCC having served at some point during the audit period. In addition, the public survey was posted on and available for download from KBM's web site ([www.kbm.on.ca](http://www.kbm.on.ca)). The purpose of the survey was to solicit public input and to provide respondents with an opportunity to identify and discuss any site-specific concerns on the Forest. A copy of the survey can be found in Appendix F.

Of the 221 surveys mailed out, two responses were received as a result of the public survey mail-out. A summary is presented in Appendix E.

Notices of the Independent Forest Audit for the Armstrong Forest were placed in five local newspapers (the *Wawatay News*, the *Thunder Bay Chronicle Journal*, *Thunder Bay's Source*, the *Nipigon Red Rock Gazette*, and the *Geraldton Times Star*) in order to further solicit public input on forest management activities on the Forest for the period under audit. A copy of the public notification can be found in Appendix G.

3. Field Site Selection: The audit team carried out a preliminary site selection prior to meeting with Norampac and MNR staff. Annual Work Schedules (AWSs) and Annual Reports (ARs) were used to ascertain the amount and type of forest operations carried out on the Forest during the course of the audit term. A stratified random sample of sites was then selected to ensure that selected sites were representative of activities conducted on the Forest during the audit term. A pre-audit meeting was held in Red Rock on April 25, 2006. Much of the pre-audit meeting was devoted to the preliminary site selection for the field portion of the audit by Norampac and MNR representatives.
4. Pre-audit Document Review: Prior to the nine-day site visit, the audit team reviewed documents provided by Norampac and MNR including, but not limited to the following:
  - 2000-2005 Armstrong Forest FMP,
  - 2005-2010 Armstrong Forest FMP,
  - 1995-2000 Report of Past Forest Operations (RPFO) for the Armstrong Forest,
  - 1990-1995 RPFO for the Armstrong Forest,
  - 2001-2005 ARs,
  - 2001-2006 AWSs,
  - Comparison and Trend Analysis of Planned versus Actual Forest Operations Report (Trend Analysis Report),
  - 1996-2001 IFA Report for the Armstrong Forest,
  - Action Plan for the Armstrong Forest 1995-2001 IFA, and
  - Action Plan Status Report for the Armstrong Forest 1995-2001 IFA.
5. On-Site Audit: The audit team spent eight days on site conducting the office and field portion of the audit from June 12 to June 18, 2006 inclusive and June 27, 2006. The audit team conducted interviews with staff from Norampac, MNR Thunder Bay District, MNR Northwest Region, MNR Finance

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<sup>6</sup> KBM Forestry Consultants Inc. 2006. Independent Forest Audit Audit Plan for the Armstrong Forest and Lake Nipigon Forest. 20 pp. + Appendices.

and Business Services Branch, the Centre for Northern Forest Ecosystem Research, Overlapping Licensees, wood supply commitment holders and Aboriginal community representatives. The audit team also conducted interviews with LCC members at both an evening meeting in Armstrong on April 19 as well as individually in some cases. The audit team examined documents, records, and maps at Norampac and MNR offices, and spent two days in the field examining forestry practices at 24 field sites (Figure 1). Norampac, MNR, Overlapping Licensees, FFC and LCC representatives accompanied the audit team in the field to examine the field sites.

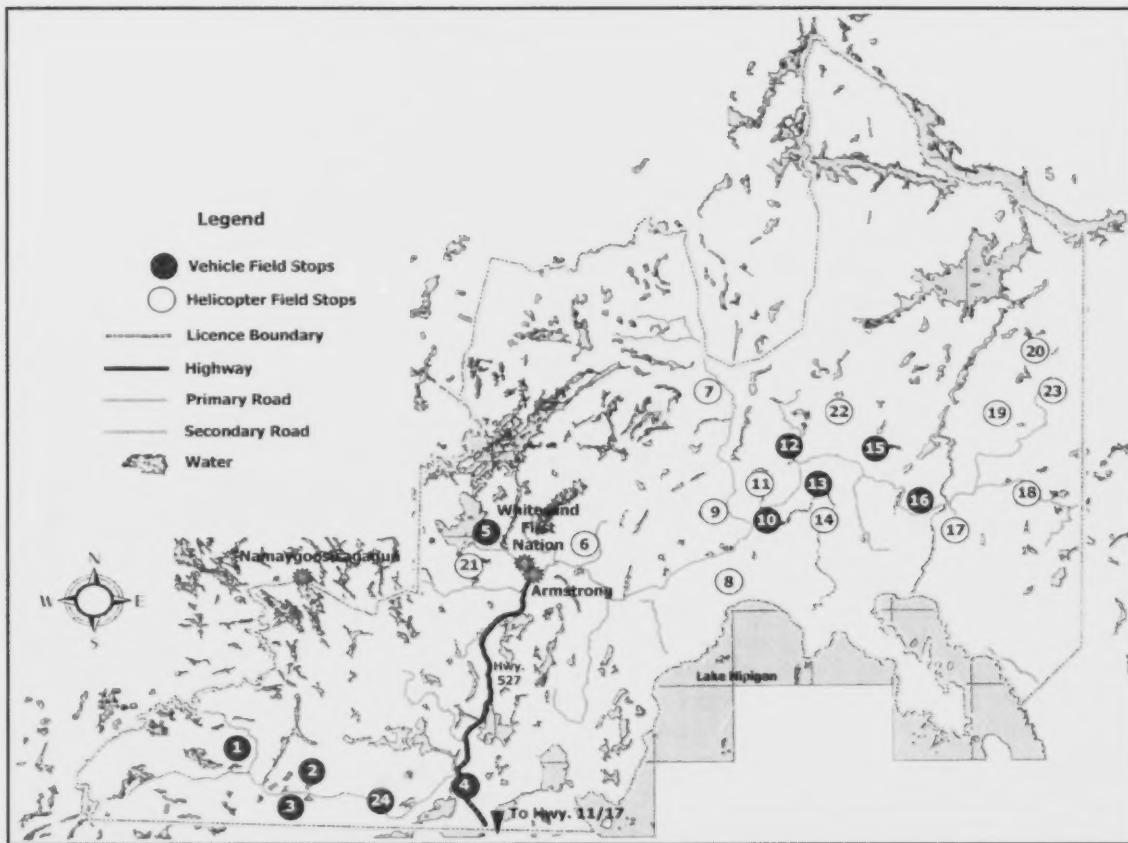


Figure 1. Audit field site locations on the Armstrong Forest.

KBM committed to a sampling range of between 10 and 25 percent of key activities and operations conducted on the Forest. Table 1 presents the sampling intensity represented by the audit of the field sites on the Forest. The objectives of the field site visits were to confirm that on-the-ground activities were conducted according to the FMP, conformed to provincial laws, regulations, and guidelines, and were effective at meeting planned objectives. A sample of all key forest management activities was examined on the ground. The audit team relied on a helicopter to reach a number of the field sites to gain a better overview of forest management activities, to deal with access constraints and to enable a more efficient audit.

A closing audit meeting was held in Red Rock on June 27, 2006. The meeting provided a forum for the audit team to present and discuss preliminary audit results with Norampac, MNR, Overlapping Licensees and the FFC and LCC representatives.

6. Final Report: The audit results are presented in conjunction with a brief description of the audit process and the forest license area under review. Within the report, the audit team makes recommendations and suggestions aimed at improving forest management. An important distinction

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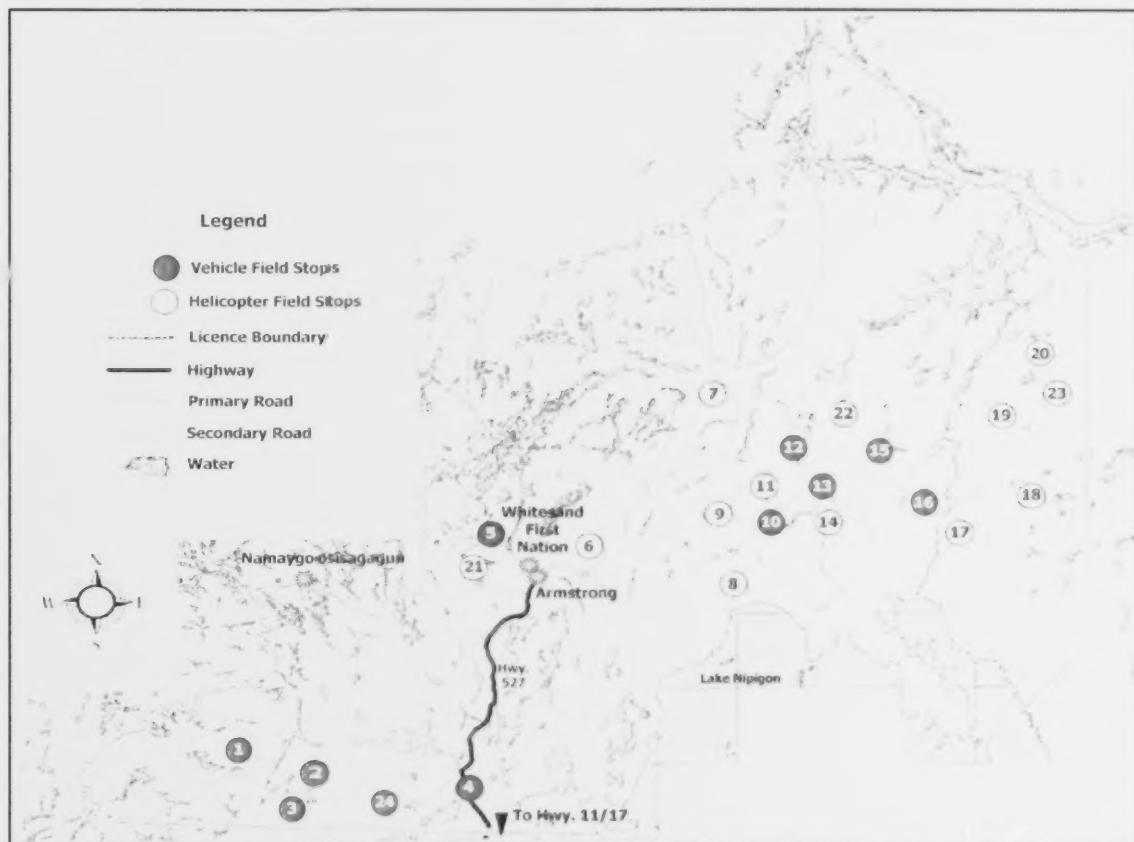


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Table 1. Audit sampling intensity for the Armstrong Forest (including salvage<sup>a</sup>).

Activity	Total Area/Number (2001-2006) <sup>b</sup>	Area/Number Sampled	Percent Sampled (%)
Harvest (ha)	19,024	4,756	25
Renewal (ha)	28,151	6,694	24
Tending (ha)	5,324	1,830	34
Free-to-Grow (ha)	4,772	2,620	55
Areas of Concern (#)			
General Categories <sup>c</sup>	15	14	93
Specific Areas of Concern <sup>d</sup>	56	10	18
Road Construction (km)	13	21	100+
Road Maintenance (km)	1,013	214	21
Specified Procedures Review <sup>e</sup> (ha)	5,291	1,878	35

<sup>a</sup> Salvage was in excess of 7,000 ha for the audit period.

<sup>b</sup> Harvest, renewal and tending area is based on four years actual and one year projected.

<sup>c</sup> The 2005-2010 FMP created general categories of Areas of Concern (AOC) to encompass different types of AOCs present on the Armstrong Forest with similar prescriptions.

Examples include fisheries/water quality, stick nests, and tourism/recreation.

<sup>d</sup> The 2005-2010 FMP also created specific AOCs such as 315-1 Caribou Lake.

<sup>e</sup> The Specified Procedures Review involved the verification of maps, records, and fieldwork associated with Forest Renewal Trust Account expenditures for 2004-2005.

is made between Recommendations and Suggestions. Recommendations draw attention to deficiencies in forest management that require corrective action. In most cases, Recommendations are a result of non-conformance to a law and/or policy, or specify a lack of effectiveness in forest management activities. Recommendations arising from this audit must be addressed in an action plan developed by Norampac in consultation with the District Manager and designated Regional and Forest Management Branch representatives of the MNR, as per Appendix E of the IFAPP. Suggestions are less serious in nature and provide advice for improving particular aspects of forest management. The auditees are not required to address Suggestions in the Action Plan. In addition, the audit team may highlight exceptional management practices or high level of performance noted on the Forest through a Best Practice.

### 2.1.3 The Audit Team

The audit was conducted by an independent audit team assembled by KBM under contract with MNR. The audit team consisted of eight members:

- Herb Bax, R.P.F., CF/CFA, CEA (SFM), EMS (LA) – Lead Auditor
- Laird Van Damme, R.P.F. - Harvest Operations Auditor
- Peter Higgleke, R.P.F. - Wildlife/Ecology Auditor
- Brad Chaulk, R.P.F. - Silviculture Auditor
- Dave West, R.P.F. - Planning Auditor
- Keith Hautala, M.Sc.F. - Forest Modeling (SFMM) Auditor
- Mary Anne Seabrook - First Nations Auditor
- Terri Dawyd - Audit Secretariat

Audit team members and their responsibilities are described in Appendix B.

### 2.1.4 Guiding Principles

The IFAPP identifies the components of the audit process. The audit protocol consists of principles, criteria, and procedures. The eight guiding principles are described in Appendix C. Each principle contains a series of criteria that guide the audit team during its assessment of the achievement of the

principles. For each criterion a number of procedures serve to assess the auditees' compliance and effectiveness. KBM assigned each of the applicable procedures to an auditor who in turn examined the evidence for conformity to the procedure.

## 2.2 Forest Management Context

### 2.2.1 Location of the Armstrong Forest

The Armstrong Forest is located within the Thunder Bay District of MNR's Northwest Region (Figure 2). It borders the northern shore of Lake Nipigon and the southeastern boundary of Wabakimi Provincial Park. There are three small communities located on or within the boundaries of the Forest; Armstrong, Namaygoosisagagun (community of Collins), and Whitesand First Nation.

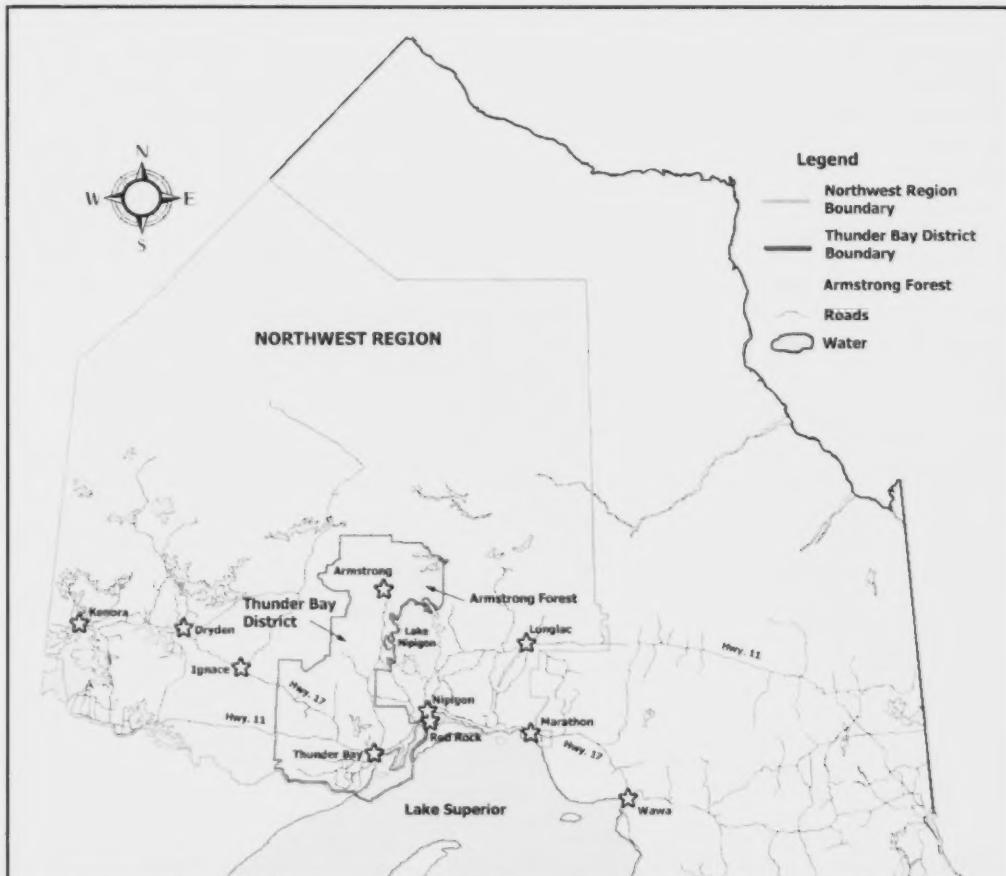


Figure 2. Location of the Armstrong Forest within the MNR Northwest Region of Ontario.

### 2.2.2 Armstrong Forest Overview

The logging history on the Forest dates back to the 1930s and 1940s when Hammermill Pulp and Paper Company and Northern Wood Preservers operated portable sawmills in the Wabinosh-Waweig-Bukemiga-Obonga-Pishidgi Lakes area, producing mainly railway ties. The labour force for many of these camps consisted of prisoners of war during World War II. Operations were also conducted in the Minatree-Lamaune Lakes area commencing in 1939. This area was previously under license to Kimberly-Clark and became part of the Armstrong Management Unit in 1976.

Prior to 1975, most of the area covered by the Armstrong Forest was licensed to St. Lawrence Corporation (a predecessor company to Domtar). In 1975 the Armstrong Crown Management Unit was established for a 20-year period in order to stimulate the local economy, which had suffered a serious setback with the closure of the Canadian Armed Forces radar station at Armstrong. With the establishment of the Armstrong Crown Management Unit, the remainder of the license area became the Domtar Management Unit. In 1982 the MNR and Domtar mutually agreed to manage these two units collectively, first as the Armstrong Management Unit, and starting in 1990, as the Armstrong Forest. This amalgamation simplified management planning for the area resulting in only one allowable annual cut and management plan for the two units.

The current boundaries of the Forest were established in 1997. At that time approximately 204,200 ha of the landbase of the Forest was removed for inclusion in the expansion of Wabakimi Provincial Park. The original western and northern boundaries of the Forest were changed significantly to incorporate park values. In 2002, the SFL was transferred from Domtar to Norampac.

Forest management planning activities are conducted by Domtar's forestry department based at Red Rock, on behalf of Norampac. Renewal and maintenance operations on the Armstrong Forest are planned and implemented by Domtar, Buchanan Forest Products Ltd. (BFPL) and Whitesand Forestry.

The Armstrong Forest supplies Norampac's (formerly Domtar) linerboard mill at Red Rock with mill furnish through a fibre exchange agreement with the BFPL-owned sawmill Great West Timber Ltd. (Great West Timber) in Thunder Bay. The purpose of this agreement is to facilitate the exchange of wood fibre between Norampac and Great West Timber thus assuring both parties of a reliable, secure, economical supply of fibre for their respective mill operations at Red Rock and Thunder Bay. At Red Rock, Norampac maintains a 400,000 metric tonne kraft linerboard mill. This mill employs approximately 420 people and is the major employer for the people of Red Rock, Nipigon and surrounding communities. Great West Timber's random length sawmill in Thunder Bay currently produces 200,000,000 fbm annually, and employs 406 people from Thunder Bay and the surrounding area.

Whitesand Forestry Woodlands Division holds a Forest Resource License (FRL) to harvest conifer and hardwood from the Armstrong Forest. This operation supplements the BFPL operation to supply sawlog material to Great West Timber and subsequently Norampac through fibre exchange. There are commitments from the Forest for significant volumes of hardwood (poplar) to Longlac Wood Industries in Longlac and to the Kimberly-Clark mill in Terrace Bay. There is also a white birch commitment to the Buchanan Northern Hardwood (Northern Hardwood) mill in Thunder Bay.

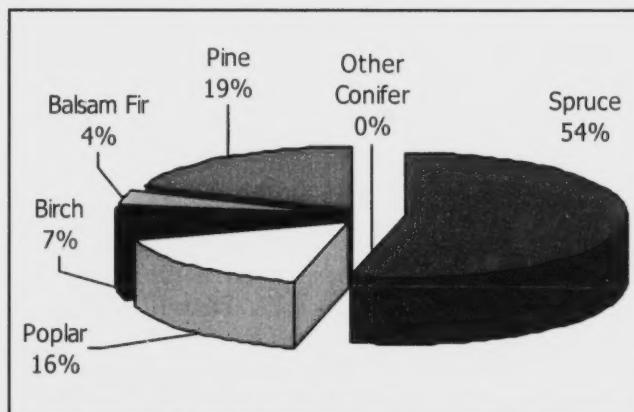


Figure 3. Summary of Armstrong Forest Crown-managed production forest by working group. (The working group is defined by the dominant species within a forest stand.)  
Source: 2005-2010 Armstrong Forest FMP.

The Armstrong Forest lies entirely within the Boreal forest and comprises a total area of approximately 612,000 ha of which 486,000 ha, or approximately 79%, is Crown-managed production forest. Tree species composition is typical for the Boreal forest and is predominantly spruce, pine, and poplar with lesser amounts of birch, balsam fir, cedar, and larch as shown in Figure 3. The Forest landscape is influenced by large natural disturbances including fire, blowdown, and insect predation.

The 2005-2010 FMP describes the current age-class imbalance on the Armstrong Forest.

The predominance of middle-aged stands is the result of extensive forest fires over much of the Forest between 1900 and 1940 followed by a period of fire suppression and little harvesting which resulted in little disturbance. It is evident that fire suppression activities over the last 50 years have had an impact on the current forest distribution. The average age of the current distribution weighted by area is 99.1 years versus an average age of 60 years in the assumed historic forest condition. Figure 4 illustrates the effects of limited harvesting and fire suppression on the age-class distribution of the Forest. Specifically, the period with limited logging activity and increasing fire suppression activities (i.e. 30-50 years ago) shows a lack of regeneration and an abundance of older forest. This is sometimes called an age-class "gap". It is not until logging activity on the forest increased (approximately 25-30 years ago) that the young regenerating forest began to approach a historic like age-class distribution. Clearly, the age-class gap depicted in Figure 4 will affect many of the strategies and decisions in this FMP (2005-2010 FMP, page 20.).

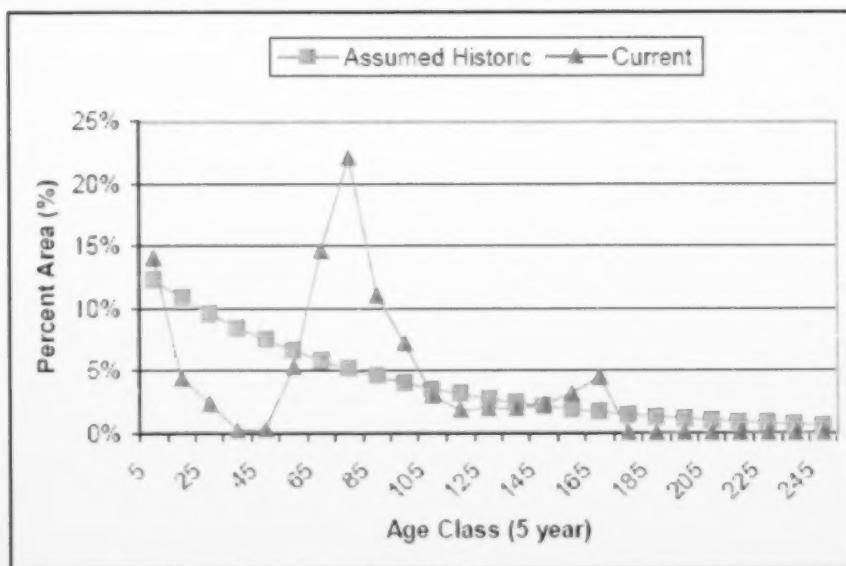


Figure 4. Current and assumed historic age-class distribution for the Armstrong Forest. Source: 2005-2010 Armstrong Forest FMP.

### 2.2.3 Issues Impacting Forest Management

The IFAPP requires a review of high priority aspects (HPAs) of the auditees' systems or activities before the site visit takes place. HPAs can include significant management challenges that are inherent to the forest (e.g. presence of woodland caribou or extensive areas of sensitive soils), or can be specific issues that have arisen during forest management planning or plan implementation (e.g., conflicts with other forest users over proposed forest management activities).

Representatives of both auditees (Norampac and the MNR Thunder Bay District) were contacted by the audit team to develop the following list of HPAs (the sections in the audit report where the HPAs are addressed are indicated in parentheses):

1. The ability of the forest industry (commitment holders on the SFL) to deal with short- and medium-term fibre supply reductions in both softwood and hardwood, due to the current age-class imbalance of the forest (Figure 4), as well as spatial planning issues such as: implementation of the Forest Management Guide for Natural Disturbance Pattern Emulation<sup>7</sup>

<sup>7</sup> MNR. 2002. Forest Management Guide for Natural Disturbance Pattern Emulation. Queen's Printer for Ontario. 24 pp. + Appendices.

(NDPEG), marten cores, woodland caribou mosaic and protection of remote tourism values. These issues continue to impact negatively on the level and composition of the Available Harvest Area (AHA). These issues also negatively impact the ability to allocate the AHA in a manner allowing for cost efficient and effective operations (block size, location, proximity to all weather access etc.) as well as other forest resources and uses. It appears that the demand for a wide variety competing, and increasing number of benefits from a finite resource base is reaching the point where not all the needs can be met. (Section 3.8)

2. The development and implementation of mutually agreeable Area of Concern and road access prescriptions with Remote Tourism operators. (Section 3.7)
3. Application of the Woodland Caribou mosaic, road rehabilitation, tourism, and moose management guidelines. (Section 3.3.1)
4. Socio-economic issues regarding access to the Forest, employment opportunities for members of the communities of Armstrong, Whitesand First Nation and Collins, the failure of First Nations to utilize the employment opportunities made available, and the lack of Native Values information from First Nations. (Sections 3.2.3, 3.8)
5. Slash management. (Section 3.4.2)
6. "Snowdown" response and impacts. (Sections 3.3.5, 3.4.2, 3.7.3)
7. The road link between the Armstrong and Lake Nipigon Forests. (Section 3.2.1)

### 3.0 Summary of Audit Findings

The results of the audit are presented according to the eight principles contained within the audit protocol identified in Appendix C.

#### 3.1 Commitment

Commitment is assessed in terms of the existence of vision, mission and policy statements of the lead organizations. These statements provide long-term guidance and direction as to how the organization's goals will be achieved and must be reflected in the day-to-day operations of the organization.

Norampac is a joint-venture company owned by Cascades Inc. (50%) and Domtar Inc. (50%). Norampac operates based on two fundamental values: a social conscience and respect of environmental resources. The company meets its social commitment through producing recyclable products; achieving environmental ISO accreditations, investing in research and providing donations to charitable groups and other socially responsible organizations.

As the company managing the daily activities on the Armstrong Forest, Domtar's commitment to Sustainable Forest Management (SFM) is a critical factor in the audit. Domtar has modern vision and mission statements that communicate its long-term pledge to becoming a leader in "*responsible, progressive and sustainable forest management*". The overarching corporate policy statement "*A forest for all, for always*" effectively captures its commitment to sustainability. Domtar also has well developed, detailed policy documents underscoring its commitment to SFM including a Forest Policy, an Environmental Policy, and a Fibre Use and Sourcing Policy. In addition to its commitment to SFM through the management of activities on the Forest, Domtar's policy documents also highlight its commitment to engaging public participation, working with First Nations, training and involving employees and contractors and reducing the use of pesticides.

Copies of the vision and mission statement and above-mentioned policies were posted at Domtar's woodlands office in Red Rock, are available on the corporate website and form part of the Environmental Management System (EMS) program.

Domtar Inc.–Forest Products Group–Red Rock has an EMS which has been certified to the ISO 14001 standard since October of 2003. The creation of a comprehensive EMS program is the way in which Domtar ensures its SFM commitment is reflected in day-to-day activities. The EMS program is updated annually to maintain current, and is reviewed with staff and contractors working on the Forest each year. Interviews with Company staff confirmed that they were familiar with and committed to the vision, mission and policy statements in place during the audit period.

MNR Forest Division has a vision and mission statement addressing their commitment to SFM by "*...providing balanced environmental, social and economic benefits now and for the future*". All forest policies and management practices on Crown lands must conform to the Policy Framework for Sustainable Forests<sup>8</sup>, which cover such matters as harvesting and regeneration, the management of old-growth forests and the protection and conservation of non-timber values. The goal, principles and objectives in this document capture MNR's commitment to SFM which is entrenched in law in the CDSA (1995). MNR expresses its strategic direction in meeting its commitments to SFM through the following documents:

- the Statement of Environmental Values<sup>9</sup>;
- the 2000 policy statement Beyond 2000<sup>10</sup>; and

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<sup>8</sup> MNR. 1994. Policy Framework for Sustainable Forests. 5 pp.

<sup>9</sup> MNR. 1995. Statement of Environmental Values. 6 pp.

<sup>10</sup> MNR. 2000. Beyond 2000. 20 pp.

- the 2005 policy statement Our Sustainable Future<sup>11</sup> (released in February 2005 and therefore applicable to the last year and two months of the audit period).

Discussion with MNR staff confirmed that they are familiar with and committed to the strategic direction contained in the documents listed above.

## 3.2 Public Participation

### 3.2.1 Local Citizens Committee

The Armstrong Forest LCC was established in 1995. In October of 2004, the LCC examined the relevant phase-in provisions of the 2004 FMPM. It was not until March 2005 that the membership requirements under the 2004 FMPM phase-in provisions were reviewed and compared against the membership list at the time. The LCC found that a majority of the interest groups added to the list in the 2004 FMPM did not exist in or around Armstrong and were therefore not applicable.

Considering that there are only three small communities in or near the Forest, there was good representation on the LCC (Table 2). The LCC did have problems meeting quorum at a number of meetings during the audit term and attempted to address that concern by expanding its membership. Notices were posted in the community and a bulk mail out was issued that resulted in one new member.

Table 2. Armstrong Forest LCC representation.

2005 Armstrong Forest LCC	
Interest Group	Representation
Angler/Hunter	2
Forest Union	0
Tourism	3
Naturalist	2
Woodworker	0
Independent Loggers	0
Economic Development	2
Aboriginal Community	1 Inactive
Recreationalist	0
Mineral Sector	1
Forest Industry	2
Trappers	1
General Public	1 Active, 1 Inactive
Local Business	1
<b>Total*</b>	<b>17</b>

\*Total of 12 members with some representing more than one interest group.

There were some concerns raised by members of the LCC that there was an over-representation of tourism interests on the Committee. Out of 12 members, three (25%) had recognized tourism industry interests. The audit team has seen other LCCs in the province divide the tourism seat to recognize the different needs of road-based tourism operators compared to remote-based tourism operators. The Armstrong Forest LCC may want to consider this approach.

The LCC Terms of Reference did not meet the requirements of the 1996 FMPM. In particular, reference to the following responsibilities of the LCC was not included:

- increasing the effectiveness of the five-stage public consultation process by participating in its implementation, and in the consideration of any additional formal public consultation opportunities that would be useful, in the context of local circumstances and needs;
- participating in the identification and analysis of management alternatives;
- participating in the development of the values map(s);
- assisting in monitoring the performance of plan implementation.

Therefore, the Terms of Reference did not capture the LCC's role in the planning process, although the audit team noted that the LCC did participate in many of the prescribed activities. The 2004 FMPM has changed the requirements for the LCC Terms of Reference by expanding the list of required content. The

<sup>11</sup> MNR. 2005. Our Sustainable Future. 21 pp.

LCC will be required to update the Terms of Reference at the beginning of Phase I planning for the 2010-2020 FMP. To ensure that this is accomplished, the audit team makes the following recommendation.

**Recommendation 1: The Ministry of Natural Resources must ensure that the Local Citizens Committee reviews and updates its Terms of Reference to meet the requirements of the 2004 Forest Management Planning Manual.**

The LCC has performed well. Meetings are held in a public building and are open to the public. They are generally held every other month with a tendency to be more frequent in FMP planning years. Given the fact that all members are volunteers, the attendance is fair with an attendance rate of 55%. Five members have attended more than 70% of the meetings with the LCC chair only missing two meetings in the five years covered by this audit. There are two members of the LCC that rarely attend meetings thus reducing the number of active members to 10. This means that there were potential gaps in the representation, particularly that of Aboriginal communities. The LCC has recognized this and plans to discuss membership concerns in the fall of 2006. A summary has been provided in Table 3.

Table 3. Summary of Armstrong Forest LCC members' attendance at meetings.

Year	No. of Meetings	Average Attendance (%)
2001-2002	6	47
2002-2003	7	55
2003-2004	9	56
2004-2005	7	57
2005-2006	5	63
<b>Total</b>	<b>34</b>	<b>55</b>

There was some concern expressed by members that the meetings could be run more effectively. Meetings tend to be long with extensive discussion on a variety of topics. Discussions, although useful, seldom resulted in actions or decisions. MNR was reluctant to play the role of facilitator out of concern for appearing to control the LCC. It is however, the role of the MNR to provide training and assistance as required to make the LCC more effective. In this capacity, the MNR should consider providing guidance and/or training on improving the quality of meetings. On other forests (e.g. the Nipigon East Area Local Citizens Committee for the Nipigon Forest) the audit team has noted lists

or registers used as part of meeting minutes to track action items and recommendations. This was effective at focusing discussions and ensuring that actions and recommendations were acted upon.

**Suggestion 1: The Ministry of Natural Resources should consider transferring some of the practices used by the Nipigon East Area Local Citizens Committee to the Armstrong Forest Local Citizens Committee, including the use of registers for action items and recommendations.**

The LCC nominated an individual to represent it on the 2005-2010 FMP planning team. Due to attendance issues, the LCC nominated a replacement representative to the planning team. The LCC representative attended 23 out of 30 planning team meetings (~77%) and was an active participant on the planning team as well as the Biodiversity Task Team. A review of LCC meeting minutes, planning team minutes and discussions with members indicated that there were some concerns with the LCC representative on the planning team not conferring with the LCC before strategic decisions were made. This was an issue identified in the previous audit that resulted in a recommendation. The Committee as a whole was able to address this concern later in the planning process through the LCC reports and the LCC statement in the 2005-2010 FMP.

A review of the LCC meeting minutes indicated that the LCC participated in the development and analysis of management alternatives and had an opportunity to review the values maps. The LCC also had the opportunity to inspect each AWS during the audit period as well as the aerial herbicide programs and prescribed burn plans. The review of minutes also indicated that amendments were reviewed as required. Like many LCCs in the province, a protocol has been developed to permit the processing and approval of administrative amendments followed by an information update for the LCC. This protocol has been used appropriately during the audit period.

The LCC raised the issue of the proposed road link joining the Armstrong Forest with the Lake Nipigon Forest during interviews and at the pre-audit meeting. While this issue does not fall within the time-frame or scope of this audit, the audit team recognized that it is of significant concern to the LCC. Concern was expressed over the mechanisms available to the LCC to engage in the forest management activities on an adjacent forest.

The audit team concludes that the LCC was effective in fulfilling its role. This finding is noteworthy considering the relatively small available population from which it draws its members. The audit team compliments the LCC on its dedication and high level of volunteer support.

### **3.2.2 FMP Standard Public Consultation Process**

Both the content and the time requirements of the FMPM were met in the issuance of all FMP public notices under the standard public consultation process. However, forest management planning public consultation notices were not placed in any "*publications in the native media*" as required by the 1996 FMPM. The 2004 FMPM has modified the requirements for the involvement of Aboriginal communities in forest management planning, including the provision of notices to Aboriginal communities. The MNR is required to develop a consultation approach with each Aboriginal community in or adjacent to the Forest whose interests or traditional uses may be affected by forest management activities. The 2004 FMPM also describes consultation efforts that are "*required if a consultation approach with an Aboriginal community has not been agreed upon, or the Aboriginal community chooses not to use the agreed upon approach.*" The 2004 FMPM also requires that Aboriginal media that may be identified through the consultation process and/or is intended to be used throughout the planning process must be identified as such in the Terms of Reference.

**Recommendation 2: The Ministry of Natural Resources must ensure that forest management planning notices to Aboriginal communities are placed in the Aboriginal media identified in the Terms of Reference of the next forest management plan.**

During the preparation of the 2005-2010 FMP there were three issues for which the issue resolution process was used. As all three were initiated prior to the phase-in period of the 2004 FMPM (September, 2004), the issue resolution process as prescribed in the 1996 FMPM was used. All process steps and timelines reviewed were followed. In two of the cases, the SFL holder initiated an issue resolution process citing concerns over meeting planned deadlines should the issues not be resolved. In both these cases the entire issue resolution process was used and individual Environmental Assessment (EA) requests were submitted. The third case was dropped by the proponent during the process.

The two requests for individual EAs were made on January 6, 2005 and since they occurred after the implementation date of the 2004 FMPM both requests followed the process outlined in that manual. In both cases MNR was notified by the Ministry of Environment (MOE) on January 27, 2005. MNR responses were submitted in May and April of the same year. According to the 2004 FMPM "*The Minister of the Environment shall normally decide on the request within 45 days of the receipt of all necessary information from MNR.*" (2004 FMPM, page A-127) In the case of these two Individual EA requests a decision was not rendered by the MOE until May 18, 2006. According to the 2004 FMPM:

If the Minister of the Environment has not decided on the request within 45 days of receipt of all necessary information, the Director of Environmental Assessment and Approvals Branch, shall provide the reason for the delay and the expected timeframe for a decision, to the Minister of Natural Resources, the MNR District Manager and MNR Regional Director, the plan author and the person(s) requesting an individual environmental assessment. (2004 FMPM, page A-127)

There is no evidence to suggest that the Director submitted the reason for the delay or identified an expected time frame for a decision. As this process is outlined in a regulated manual it is the belief of this audit team that the MOE is bound to follow it. Lengthy delays in making these kinds of decisions can

have serious economic and social consequences and provides an unacceptable level of uncertainty for the parties involved. In this case it took a full year for MOE to render a decision.

**Recommendation 3: Corporate Ministry of Natural Resources must work with the Ministry of the Environment (MOE) to ensure MOE's adherence to the requirements of the Forest Management Planning Manual and the Forest EA Declaration Order MNR-71, Condition 8, with respect to ensuring timely decisions are made on requests for individual environmental assessments.**

**Recommendation 4: Corporate Ministry of Natural Resources must change the scope of the Independent Forest Audit to include all parties who have an obligation to follow the processes outlined in the Crown Forest Sustainability Act and its regulated manuals.**

### **3.2.3 Native Peoples Consultation**

The CFSAs and the FMPM require opportunity for Aboriginal input and involvement in the forest management planning process. Aboriginal communities have the option of participating in the standard public consultation process or choosing the additional consultation referred to as the Forest Management Native Consultation Program (FMNCP). Through this process, the MNR District Manager contacts members of identified Indian Reserves, Band Councils, Treaty Organizations, and Tribal Councils regarding forest management planning in their area. Where the First Nation community has opted for its own process, notices are to be advertised in Aboriginal media and in the appropriate Native language if so requested by the Aboriginal community. The FMPM also requires that MNR develop a Native Background Information Report and a Report on the Protection of Identified Native Values.

There are two Aboriginal Communities within or adjacent to the Armstrong Forest: Whitesand First Nation and Namaygoosisagagun (the community of Collins). Although Namaygoosisagagun is not recognized by Indian and Northern Affairs Canada as an official band with reserve status, it was invited to participate in the forest management planning process along with Whitesand First Nation.

The Stage One FMP Notification and Invitation to Participate was sent to each Aboriginal<sup>12</sup> community, however, the notice was not issued in the Native language as required by the 1996 FMPM. Discussions with the MNR Forester at the time indicated that this was discussed by the planning team and that the Aboriginal communities have never required the notices to be in their Aboriginal language. Since this is a requirement of the 1996 FMPM, documentation should be on file to indicate that the Aboriginal community does not require it. The 2004 FMPM has changed the requirement regarding issuing public notices in the Aboriginal language. The onus is now on the Aboriginal community to request of MNR that notices required under the 2004 FMPM be issued in the desired Aboriginal language. If no such request is made, notices issued in English will meet the requirements. Nonetheless, MNR should be maintaining complete and accurate files.

**Suggestion 2: The Ministry of Natural Resources should maintain accurate and complete records of consultation with Aboriginal communities in order to be able to demonstrate that requirements of the Forest Management Planning Manual are being met.**

There was no Stage Two FMNCP Notice on file, although there was a fax and an email confirming the date of the First Information Centre. Both communities held First Information Centres. The Native Background Information Report for Namaygoosisagagun was completed with input from the community. Around the time of the First Information Centre, a contract was negotiated between MNR and Lake Superior Development Trust to update the Native Background Information Report for Whitesand First

<sup>12</sup> The 1996 FMPM uses the term *native* throughout the text of the manual. The 2004 FMPM uses the term *Aboriginal* throughout the text of the manual. To be consistent, this audit report will use the term *Aboriginal* whether referencing the 1996 or 2004 FMPM.

Nation. Although efforts have been made by MNR staff to obtain the report, it was still outstanding at the time of the audit.

**Recommendation 5: The Ministry of Natural Resources must follow up with Lake Superior Development Trust to ensure the Native Background Information Report for Whitesand First Nation is delivered.**

Stage Three and Four FMNCP Notice requirements were met although the copies of the notices on file did not have the MNR logo. In addition, the covering letter did not make reference to the attached notice. This is another example where Suggestion 2 is warranted.

In addition to providing consultation opportunities for Aboriginal communities to participate in the forest management planning process, it is a requirement for MNR District Managers to conduct negotiations with Aboriginal communities at the local level in order to identify and implement ways of achieving a more equal participation by Aboriginal peoples in the benefits provided through forest management.

Both Whitesand First Nation and Namaygoosisagagun were invited by MNR to sit on the planning team for the 2005-2010 FMP and both accepted and had representation. MNR also provided each Community with one scholarship opportunity for a student from each Community to attend the Forestry Technician Program at Confederation College in Thunder Bay. Only Namaygoosisagagun took advantage of this opportunity and the student is now working for the Community at their Thunder Bay office location. The audit team compliments MNR and Namaygoosisagagun on this initiative.

A Memorandum of Agreement between Whitesand First Nation and MNR was signed in December 2000. This agreement ensured protection of identified native values, support for additional Native Values mapping, working towards the development of a submission package concerning forestry training and providing for 550,000 m<sup>3</sup> in overlapping licenses from the Armstrong Forest over the 2000-2005 period and 70,000 m<sup>3</sup>/year in contract from BFPL. In addition, Whitesand First Nation was also to be provided harvest and silviculture opportunities in salvage areas. Whitesand First Nation is satisfied with the working relationships with both Norampac and MNR.

Namaygoosisagagun requested a bump-up of the Armstrong Forest 2000-2005 FMP in February, 2001 based on unresolved issues. These included: employment opportunities, timing and size of harvesting blocks, reforestation, silviculture and harvesting opportunities. Namaygoosisagagun was not opposed to forest management activities but requested resolution to many of the issues prior to commencement of forest management activities in its traditional land use area.

There was evidence of meetings held during the 2000-2005 period to come to some agreement in resolving the outstanding issues. As a result, an "Enhanced/Ongoing Consultation Agreement" between Namaygoosisagagun/MNR/Domtar/Norampac was signed in January 2004. However, Namaygoosisagagun did not feel the terms of the agreement were being adhered to by the other parties. The community felt that insufficient employment opportunities were being provided from the Forest. In comparison to Whitesand First Nation, who had derived economic benefit from the Armstrong Forest, there had been very little benefit to Namaygoosisagagun. The audit team recognizes that the formal agreement has been in place for only two years and makes Suggestion 25 in Section 3.8.

### **3.2.4 Annual Work Schedule Public Inspection**

For the most part, notices of AWS Inspection were issued in accordance with the applicable FMPM requirements. The 2004 FMPM requires MNR to publish a Notice of AWS Public Inspection in local publications in the Aboriginal media. Interviews with MNR staff indicated that the Notice of AWS Public Inspection for the 2005-2006 AWS was not placed in any local publications in the Aboriginal media. The 2004 FMPM has modified the requirements for the involvement of Aboriginal communities in forest management planning, including the provision of the Notice of AWS Public Inspection. The MNR is required to develop a consultation approach with each Aboriginal community in or adjacent to the Forest

whose interests or traditional uses may be affected by forest management activities. The 2004 FMPM also describes consultation efforts that are “*required if a consultation approach with an Aboriginal community has not been agreed upon, or the Aboriginal community chooses not to use the agreed upon approach.*” Recommendation 6 has been made to address this finding in light of the requirements under the 2004 FMPM.

Aerial herbicide programs were planned for each year of the audit period. Public notices were placed in local newspapers as required: one at least 30 days in advance and a second notice at least seven days in advance of the anticipated date of application. Written notices were mailed to select individuals and organizations on the Armstrong Forest mailing list that had areas of interest on the Forest located within one km of proposed spray blocks, including Aboriginal community representatives. Concerns about the aerial spraying program were raised by Whitesand First Nation and a number of meetings and discussions with Norampac were held. As a result, the aerial tending projects implemented during the audit term were reduced to address these concerns by removing selected blocks from the aerial spraying program and reducing block size of other identified blocks to allow for roadside buffers.

A Whitesand First Nation representative also participated in a helicopter survey to identify candidate tending areas proposed for treatment during three years of the audit term.

Notices for the aerial herbicide programs were not published in any Aboriginal media as required by the FMPM. The 2004 FMPM has modified the requirements for the involvement of Aboriginal communities in forest management planning, including the provision of the notices of aerial herbicide programs.

**Recommendation 6: The Ministry of Natural Resources must ensure that the Notice of Annual Work Schedule Public Inspection and aerial herbicide program notices to Aboriginal communities meets the requirements of the Forest Management Planning Manual with respect to notices in the Aboriginal media.**

Slash pile burning occurred on the Forest during each year of the audit term. Notices were issued by the overlapping licensee (BFPL) within the timeframes required of the FMPM.

### **3.3 Forest Management Planning**

#### **3.3.1 Planning Team Activities**

This audit reviewed planning team activities as they related to the production of the 2005-2010 Armstrong Forest FMP. The Terms of Reference set out the members of the planning team, their roles and responsibilities. It also outlined a detailed timeline and schedule for the production of the plan. The Terms of Reference was approved by the District Manager and Regional Director as required.

Although the Terms of Reference is a well written and complete document, it took an exceptionally long time to produce and approve. In fact, the Invitation to Participate was issued March 15, 2003 and the Terms of Reference was approved six months later on September 11, 2003. While the 1996 FMPM does not preclude the initiation of the public consultation process prior to the approval of the Terms of Reference, the 2004 FMPM does.

The MNR Area Forester and the plan author were co-chairs of the planning team and were Registered Professional Foresters at the time of plan production as confirmed by the Ontario Professional Foresters Association. Members of the planning team included a biologist, a SFMM analyst and an Integrated Resource Management specialist. The planning team also included representatives from Aboriginal communities, remote tourism and the LCC.

Planning team meetings were usually held once a month. Task teams met in between planning team meetings and provided regular updates on progress to the planning team. The planning team minutes

were exceptionally detailed and provided a good insight into how the team functioned. Given the complexity of the issues it was evident that the parties were able to maintain good professional relationships throughout the process.

The planning team was faced with a number of complex issues including the implementation of caribou guidelines and remote tourism. In reviewing the minutes it was apparent that some issues (caribou mosaic and occupancy line) occupied the team for a prolonged period of time. While discussion was good and solutions were eventually arrived upon, the time required was considerable. There appeared to be no clear timeline or approach to resolve issues and problems faced by the team. In the 2004 FMPM, planning timelines are shorter and more structured and early identification and resolution of issues will be important in keeping plans on schedule.

Both MNR and Company correspondence binders were found to be well organized and complete. All correspondence and comments received were responded to and memos-to-file were used to document telephone conversations.

Interviews indicated that members of the planning team felt they had each performed well and were complementary of each other. However, nearly half of all alterations requested by MNR in their review of the plan were identified by planning team members. This suggests that the team did not function as effectively as possible. See Section 3.3.8 for further discussion and resulting recommendation.

### **3.3.2 Resource Stewardship Agreements**

The 2005-2010 FMP includes the required statement confirming the commitment to maintain the viability of the tourism industry by protecting tourism values through the application of the Tourism and Forest Industry Memorandum of Understanding<sup>13</sup> and the use of Resource Stewardship Agreements (RSAs) as one method of protecting and sustaining these values. The FMP also includes a commercial tourism strategy that was developed by the planning team in order to meet the socio-economic objectives.

The Ministry of Tourism, Culture and Recreation provided Norampac with a list of resource-based tourism (RBT) establishments as required. Norampac mailed registered letters to all RBT operators identified on the list to invite them to express their interest in negotiating an RSA. A total of eight responses were received with five indicating an interest in negotiating an RSA.

MNR held an RSA scoping meeting in the spring of 2003 where MNR explained the relevant policy and information and the criteria it will eventually use in deciding whether to approve any RSA proposals for inclusion in the FMP. The meeting was held in conjunction with other topics of interest to resource-based tourism establishments. MNR also produced a Resource-based Tourism Values Map that was used in discussions with RBT operators throughout the process. The discussions resulted in required changes that were incorporated into the map in time for inclusion in the final FMP.

Norampac took a very proactive approach in trying to anticipate any of the concerns in advance of meeting with RBT operators in an attempt to address concerns as early as possible. According to the Management Guidelines for Forestry and Resource-Based Tourism<sup>14</sup> there is a requirement to determine the desired degree of remoteness in the forest and other needs of the resource-based tourism industry. There is ample evidence to suggest that remoteness was the key principle used by the parties in developing prescriptions for the FMP. Other concerns such as viewscapes, road access, and noise were also key issues. Maps and other information such as detailed descriptions for operations were developed and provided to interested parties.

Considerable effort was undertaken to contact and consult with RBT operators and no RSAs were signed. After developing detailed prescriptions for inclusion in the forest management plan there seems to be

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<sup>13</sup> MNR. 2000. Tourism and Forest Industry Memorandum of Understanding. 3 pp. + Appendix.

<sup>14</sup> MNR. 2001. Management Guidelines for Forestry and Resource-Based Tourism. Queen's Printer for Ontario. 24 pp. + Appendices.

little interest by the parties in developing further documents to define the business relationship. The prescriptions cover mitigation measures for addressing access, viewscapes, noise and remoteness concerns. The prescriptions were reviewed by RBT operators and modified on a case-by-case basis to ensure they met individual needs.

In most instances the values related to resource-based tourism were found to be accurately depicted on the values maps. There were some instances where outpost camps were found to be in the wrong location, and these were updated by Norampac and the updates were supplied to MNR. One area of concern is that the District mailing list is not updated when outpost camps and other facilities are bought and sold. This makes it very difficult for those developing the forest management plan to contact stakeholders that may have an interest in forest management activities in the area.

**Suggestion 3: The Ministry of Natural Resources should develop a procedure to assist in the updating of mailing lists related to resource-based tourism establishments.**

### 3.3.3 Sources of Direction

During the production and implementation of the 2005-2010 FMP numerous sources of direction were identified, made available by MNR, and used by the planning team. These sources included provincial legislation, MNR policies and guidelines, strategic direction, land use plans and implementation manuals. Most of this information is available to the public through the MNR website.

The business needs of Norampac, Overlapping Licensees and other forest products companies were presented to the planning team and LCC. The planning team also considered the needs of other users of the Forest including Aboriginal communities, trappers and remote tourism operators.

Other specific sources of direction used by the planning team on the Forest included:

- Crown Land Use Policy Atlas
- Lake Nipigon Basin Signature Site (Section 11 - Management Guidelines for the West Lake Nipigon EMA and Section 12 – Management Guidelines for the Pikitigushi EMA)
- Whitesand Provincial Park Interim Management Statement (2004)
- Obonga-Ottertooth Provincial Park Interim Management Statement (2001)
- Windigo Bay Provincial Nature Reserve Interim Management Statement (1999)
- Wabakimi Provincial Park Interim Management Statement (1999)
- Kopka River Provincial Park Interim Management Statement (1991)
- Kopka River Provincial Park Addition Interim Management Statement (2001)
- Nipigon District Fisheries Management Plan
- Thunder Bay District Fisheries Management Plan
- Species at Risk in Ontario list

A suite of silvicultural ground rules (SGRs) were developed using the Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario<sup>15</sup>. The FMP also included a substantial list of literature cited in the plan.

### 3.3.4 Introduction

The 2005-2010 FMP introduction included a brief description of how MNR's Statement of Environmental Values (SEV) under the Environmental Bill of Rights has been considered in the development of the FMP in the form of an SEV briefing note as required. The SEV briefing note was included as Appendix AD for further reference. An index to the environmental assessment components of the 2005-2010 FMP also formed part of the introduction.

<sup>15</sup> OMNR. 1997. Silvicultural guide to managing for black spruce, jack pine and aspen on boreal forest ecosites in Ontario. Version 1.1. Ont. Min. Nat. Resour., Queen's Printer for Ontario, Toronto. 3 books. 822pp.

### **3.3.5 Management Unit Description**

The 2005-2010 FMP included a thorough description of the geology, soils and sites of the Armstrong Forest and there was general discussion regarding the implication of these factors on management assumptions, strategies and decisions as per the FMPM. For instance, the FMP stated *"forest diversity strategies such as landscape pattern, forest unit composition, preferred habitat for selected wildlife species, and emulation of natural disturbances are directly dependant on the inherent composition and structure of the landscape as determined by geology, soils, and site conditions"* and *"geology, soils, and site condition provide the context for forest management activities on the forest. These factors affect all aspects of strategy development and decision-making"*.

Given the detailed description of surficial geology and landscape level ecological zones in the FMP, there was room to add text regarding specific implications. For example, the discussion of the long harvest history in the Wabinosh eco-zone could have been followed with text regarding the possible management implications of the current forest condition in this area.

Historic landscape pattern and forest condition are also discussed in general. However, some key subjects, as required in the FMPM, were not addressed. Most notably, a discussion of changes in forest types and the resultant management implications was absent. In particular, this type of information would have been useful as a precursor to the issues section which discusses the need to reduce the presence of balsam fir dominated stands and the concerns over conversion of conifer to hardwood.

Text regarding implications of geology, soils and sites and historic forest conditions on the development of the forest management plan is still a requirement of the 2004 FMPM. As a result, the audit team makes the following recommendation to ensure that this important information is included in the next FMP.

**Recommendation 7: Norampac Inc. must ensure that all required text is included in the "Geology, Soils and Sites" and "Historic Forest" sections of the next forest management plan.**

Forest management planning on Crown lands in Ontario requires consideration and protection of a broad array of natural resource values. The nature and location of these values is recorded in the Natural Resource Values Information System (NRVIS) for use in forest management planning.

Values updating surveys were completed by MNR for the preparation of the 2005-2010 Armstrong Forest FMP. In the summer of 2004, aerial surveys for moose aquatic feeding areas (MAFAs) were performed. However, a poor representation of MAFAs was encountered due to high water levels. With MAFA information needed for the FMP, the survey had to be completed again in 2005 to ensure proper MAFA representation in the values maps. The survey was completed in September 2005 but not entered into NRVIS in time for FMP preparation and submission. Instead, paper maps were provided to Norampac. Digital MAFA information was not provided until February 2006. The Forest Information Manual<sup>16</sup> (FIM) provides clear direction about the provision of values information and its timelines.

**Recommendation 8: The Ministry of Natural Resources must ensure that Natural Resource Values Information System information is provided for the forest management planning process and annual work schedule preparation as required by the Forest Information Manual.**

Digital MAFA information was examined and found to be recorded in a format that made it difficult to use. For example, lakeshores did not match planimetric lakeshores in NRVIS. Figure 5 provides two examples of MAFA boundaries not matching other information. The non-matching lines require further

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<sup>16</sup> MNR. 2001. Forest Information Manual. Queen's Printer for Ontario. 320 pp. + Appendices.

data management and interpretation. The audit team believes that this does not fully meet the requirement to provide digital NRVIS values as stated in FIM. The following recommendation is made to address this matter.

**Recommendation 9: The Ministry of Natural Resources must ensure digital moose aquatic feeding area information is consistent with planimetric boundaries to ensure utility in the forest management planning process.**

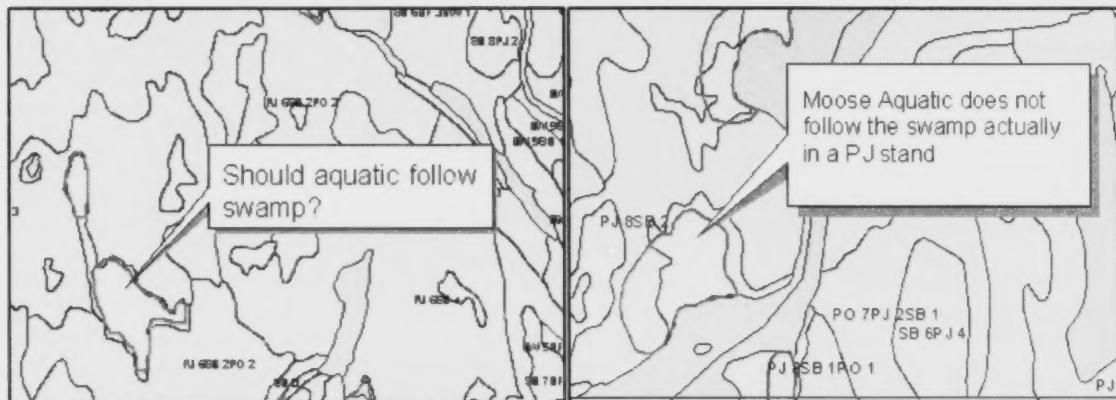


Figure 5. Examples of moose aquatic feeding area boundaries (in red) not matching other information.

The forest resource inventory (FRI) used in the 2005-2010 FMP was developed using 1990 aerial photography (panchromatic 1:20,000). The interpretation of photographs met MNR standards that have been in place since the 1960s and added an ecosite interpretation more advanced than that of most other forest management units. This critically important data source has been properly maintained and updated by the Company. The procedures used for this update are thoroughly documented.

The MNR is responsible for providing base data such as administrative layers and FRI data for parks and other parts of the Forest that are not part of the managed land base. This data was not provided to Norampac on time and the Company was forced to make do with its own data in the preparation of the 2005-2010 FMP. This shortcoming did not impair the development of the FMP as Norampac and the MNR have developed a good relationship to work out these problems.

A severe early winter storm in 2001 created widespread damage on the Forest. Heavy wet snow gathered on tree tops which was followed by strong winds to create an event that has been described as the "snowdown" event that caused varying degrees of damage, including broken tops, leaning trees, and completely blown down trees (Figure 6 and Figure 7). The damage was highly variable in type and extent within stands or groups of stands. The snowdown event included damage to younger trees. Updating the FRI using conventional means such as satellite images or supplemental aerial photography proved unfeasible because of this variability. For this reason, Norampac reduced the yield estimates in the strategic planning phase using the Strategic Forest Management Model (SFMM) by 20%. This pragmatic approach to strategic planning is reasonable. Operational planning would benefit, however, from a more systematic and map-referenced update of the inventory. Furthermore, the province has moved to ten-year FMPs from a five-year FMP making it even more important to base the next FMP on the best possible information.

The FRI is also dated in terms of the attributes it reports. The MNR silviculture guides are based upon an ecosystem classification that is different than the Company system used in the current FRI. Prior to release of the FIM, the FRI was scheduled for renewal every 20 years, and for this Forest it would be due for renewal in 2010. FIM requires FRI renewal within 25 years or by 2015 in the case of the Armstrong



Figure 6. Mature trees snapped off around the midpoint of the bole as a result of the "snowdown" event.



Figure 7. "Snowdown" damage to younger age classes.

Forest. The MNR is in the midst of upgrading the FRI procedures and standards. This initiative may also have an impact on FRI renewal schedules.

The issues above may warrant an early FRI renewal. The planning process for the next FMP should start with an approved planning inventory in 2007. There is little time left to prepare a new inventory to account for the storm and other forest changes that operate at finer scales compared to wildfire and harvesting. However, the Company has expressed an interest in amalgamating this forest with the Lake Nipigon Forest. There might be an advantage in amalgamation as well as providing an opportunity to renew the FRI on both the Armstrong and Lake Nipigon Forests in time for a 2011 FMP. Although most FRI renewals take several years to complete, more advanced technology might allow for faster turn-around times.

**Recommendation 10: The Ministry of Natural Resources and Norampac Inc. must review the status of the Forest Resource Inventory (FRI) and consider renewing the FRI and or changing Forest Management Plan schedules to account for the changes in the Forest, FRI methods and the Forest Management Planning Manual requirements.**

The current FRI is of sufficient quality to form the basis of the 2005-2010 FMP and was used by the Company to fulfill the requirements in the FMPM for describing the current forest condition. The discussion of forest composition, pattern and diversity is complete and insightful.

The discussion on wildlife habitat and landscape processes associated with Tables 2005-2010 FMP-5 and FMP-6 lacked the same level of depth that is found with the discussion of forest cover. For example, the highly unlikely trends of 1000% increase in deer habitat and more than 100% increases in other species is explained by changes in the Forest that occurred since the last FMP. In fact, these changes are model artefacts. The MNR had changed habitat matrix values between plans with no documentation, leading plan authors to struggle with interpretations. The FMP was approved with trends that are described that have little relationship to actual forest conditions.

The problems identified with Tables FMP-5 and FMP-6 suggests either a lack of diligence of the SFL holder or MNR. In this case, the MNR failed to develop and support the models required for SFL holders to report on the current forest condition in terms of habitat and landscape processes in a meaningful way.

The habitat matrices used in producing the trends in FMP 5 are the same as the matrices used in SFFM to forecast habitat values associated with expected future forest conditions. These matrices and the underlying assumptions are reviewed and updated by MNR but the process and outcome are not transparent, not reported to planning teams and often do not capture knowledge from sources external to MNR.

Of equal concern is the treatment of landscape process. Table FMP-6 has water yield units expressed as mm/ha/yr in the column header but the results are presented as percentage of second order watersheds in a disturbed condition (e.g. forest area less than 10 years of age). In addition, some of the text and table figures related to Table FMP-6 in the 2005-2010 FMP do not match (e.g. the percentage of productive forest area disturbed within 10 years differs between text and table). In the case of Table FMP-6, the water yield estimates were to be presented as an output of the RHESSys (Regional Hydro-Ecological Simulation System) model according to the FMPM. These outputs were to be provided by MNR but were not delivered to the planning team.

Despite a considerable investment in forest science to update guidelines as reported upon in its annual reports (as per MNR – 71 Condition 31) and in spite of the fact that MNR has made efforts to review these guides every five years (as per MNR – 71 Condition 38c), many of these forest management guides (e.g. Marten, Caribou and at least 19 others) have become dated. Updates often take more than ten years to occur. For example, although many guides developed in the 1980s and 1990s were considered in a comprehensive review in 2000, the updates will be found in new consolidated guides in 2007. This long period of review and updating raises questions about meeting the intent of the review which is *"to ensure they [the guides] reflect current scientific knowledge as it applies to Ontario"* (Condition 38d). By the time reviews are complete, the scientific knowledge has moved forward.

The forest management modeling tools are not subjected to the same level of scrutiny as are the guides. There is a trade off associated with this situation in that changes can be timely but may not have adequate review or disclosure. This is the case with habitat matrices that changed under the period of review without notice, rationale and peer review and the lack of output from RHESSys in FMP 6. These models are as important to planners as are the guidelines. Both the guides and models should have timely review periods with full disclosure and peer review. These two elements of forest planning (i.e.

guides and models) are closely connected to each other. The following recommendation and suggestion is made to help improve this connectivity and overall effectiveness in supporting forest planning activities.

**Recommendation 11: Corporate Ministry of Natural Resources must undertake timely scientific peer reviews of the underlying assumptions in its forest management planning modeling tools developed by MNR on a periodic basis (i.e. every five years).**

**Suggestion 4: Corporate Ministry of Natural Resources should make available the results of Recommendation 11 to the Provincial Forest Technical Committee to assist with review and revision of the Guides (MNR-71 Condition 31 and Condition 38c).**

The problems identified with FMP 5 and FMP 6 will not be repeated in future plans because the tables are no longer required under the new manual (2004 FMPM). Clearly the trends shown in these tables were problematic provincially and the decision was made to drop these reports as a requirement when the new manual was produced. This may be an unproductive way of dealing with problems, in that rather than developing effective means of reporting on trends in wildlife habitat and harvesting of second order watersheds, the reporting of these indicators is no longer required through regulated manuals.

Without FMP 5, the problems above with habitat matrices found in this audit could go undetected in future plans. FMP 8 does present forecasts of habitat change under the 2004 FMPM, but past trends are not described. Looking backwards in time helps provide confidence in the forward looking forecasts generated by SFMM and the habitat matrices.

Without FMP 6 there are no indicators related to forest hydrology unless planning teams elect to address this issue in setting plan objectives. The Forest Management Guidelines for the Protection of the Physical Environment (1997) suggests 50% of watershed area in a harvested state as an upper limit as a best management practice for planning. This threshold suggestion is consistent with FMP 6 (FMPM 1996). In Manitoba and Alberta some licensees schedule harvests to ensure various thresholds from (20 to 30%) of harvest areas in watersheds are not exceeded to protect against fluctuating water yields that can scour stream beds and increase risks of flooding. In some instances, these thresholds are voluntary and in other instances these are regulated. The auditor's work with a forest hydrologist in those regions suggest that these indicators of watershed disturbance are correlated with water quantity and quality and are an important landscape metric that can be estimated using several methods other than RHESSys, a model that is difficult to calibrate.

The above observations associated with the new FMPM (2004) suggest that the MNR is not fully compliant with the Declaration Order Regarding MNR's Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario<sup>17</sup> (MNR-71) Condition 45.

*"MNR shall maintain and further develop methodologies for use in forest management planning and reporting which:*

*[Among other items] b) investigate and address wildlife habitat supply, biological diversity and landscape management analysis across both temporal and spatial scales".*

Although MNR's scientists are working on several new landscape models (e.g. BFOLDS), work on hydrology is less forthcoming. In addition, the new models under development in describing wildlife habitat would benefit from tests against actual change data. For these reasons, the following suggestion is made.

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<sup>17</sup> MOE. 2003. Declaration Order Regarding MNR's Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario. 48 pp.

**Suggestion 5: Corporate Ministry of Natural Resources should review the 2004 FMPM and consider reintroducing the requirements for reporting changes in wildlife habitat over past planning periods and disturbance levels in second order watersheds.**

The socio-economic profile provided in the 2005-2010 FMP met the minimum requirements. The profile tends to be more of a regional profile rather than a management unit focused profile with information drawn from the 2001 Census<sup>18</sup> and the Ministry of Northern Development and Mines community profiles. Information on non-industrial uses of the Forest is weak given the high degree of concern over elements such as tourism. It was noted during the audit, that a member of the LCC expressed an opinion that remote tourism operations generated very little economic benefit to Armstrong (i.e. the majority of shopping is done in the larger "box" stores in Thunder Bay).

Namaygoosisagagun is not referenced in the profile. This is surprising given the fact that the community has been encouraged to participate in the LCC and the MNR and Norampac have met with the community to discuss economic opportunities. MNR has even entered into a Memorandum of Agreement with the community to document these efforts (Section 3.2.3).

**Recommendation 12: The Ministry of Natural Resources must include Namaygoosisagagun in the socio-economic profile of the next forest management plan.**

One of the areas the audit is asked to examine is whether forest operations are adding value to the community. In the case of the Armstrong Forest this would apply to the communities of Armstrong, Whitesand First Nation and Namaygoosisagagun. It is apparent from the profile that both Whitesand First Nation and Armstrong do receive economic benefits from the management efforts on the Forest. However, the information provided lacks the detail and analysis to determine the scale and stability of these identified benefits. No determination can be made for Namaygoosisagagun as there is no reference to that community.

Community representatives and members of the public have all expressed concern over the economic future of the communities and the region to both the LCC and the planning team. The MNR and the SFL holder have traditionally relied on the socio-economic profile and the Social Economic Impact Model (SEIM) to address the planning requirements. This is discussed further in Section 3.3.6.

### **3.3.6 Objectives and Strategies/Management Alternatives**

Objectives and targets in the 2005-2010 FMP address forest diversity, socio-economics, forest cover and silviculture as required by the CDSA and FMPM. Objectives include quantitative types which are evaluated between management alternatives, and qualitative types which are held constant between scenarios.

Mandatory management alternatives are analyzed and documented as required by the FMPM. These include scenarios to test the timber production potential of the Forest with an infinite level of silviculture spending, timber production potential with balanced silviculture spending, and the ability of the Forest to meet anticipated industrial demand. The Natural Benchmark (Null) scenario, where no harvest occurs and wildfire is the only source of forest depletion and renewal, is used to provide a basis for calculating allowable bounds of variation for some quantitative objectives such as wildlife habitat, forest unit group areas, and old growth cover.

The FMP management alternatives are analyzed with the SFMM results and input assumptions are discussed in the FMP text and Analysis Package. The FMP provides a solid discussion of the assessment of forest sustainability and objective achievement between management scenarios. The FMP also provides clear rationale for the selected management alternative in terms of sustainability and comparison to the other alternatives. The underachievement of some wildlife habitat and forest diversity

<sup>18</sup> Statistics Canada. 2001. Canada Census of Population.

objectives has been identified for the selected management alternative. However, these shortcomings are evaluated as being minimal and are deemed acceptable given the need to balance multiple and sometimes diverging objectives.

The Analysis Package is comprehensive and provides good information on the development of the model, its' input parameters, and its underlying assumptions. Model parameters are well supported and satisfy all requirements.

Assumptions related to the fire cycle, operability, and yields appear to be reasonable. The harvest eligibility criteria consist of selecting mature timber and are stratified according to the caribou mosaic designation where applicable within the Forest. Areas with terrain limitations are also excluded from the harvest. These criteria are clearly identified within the FMP. Yield curve assumptions appear to be reasonable. This is discussed further in Section 3.7 under Achievement of Sustainability.

Natural succession rules were examined during model development to check for any significant volume changes due to succession (e.g. when comparing stand volumes before and after succession points). This analysis focused on rectifying significant volume changes (e.g. greater than 30 m<sup>3</sup>/ha and more than 2% succession). The audit team noted that the model still contains succession rules which result in large volume changes (greater than 50 m<sup>3</sup>/ha) for both small and large areas of succession. Forest succession pathways should not result in changes to stand volumes. They provide a potential source of miscalculation as the model may inappropriately favour succession. The impact of these volume changes do not appear to have a significant impact on the model output, as the amount of forecasted succession area is small, but do suggest an area for further improvement (see Suggestion 6).

The modeling for the 2005-2010 FMP used the "accumulating reserves" function in SFMM to account for areas set aside from harvesting for the protection of riparian, wildlife and tourism values. A more accurate method of accounting for these reserves is to include known areas directly into the planning inventory prior to loading the landbase into SFMM. This method has the advantage of providing a more accurate reflection of areas reserved from harvesting in terms of forest unit and age class by sub-unit, and reduces errors between planned reserve areas and those forecasted by the model (see Section 3.3.7).

**Suggestion 6: Norampac should, during the preparation of the next forest management plan:**

- **Review the assessment of areas set aside from harvesting and incorporate existing reserves into the SFMM landbase to provide the model with a more accurate reflection of areas reserved from harvesting;**
- **Review succession rules during plan development to ensure agreement between pre- and post-succession volumes.**

The planning team for the 2000-2005 FMP adopted a "three-tiered management system reflecting the relative degree of caribou management intensity". The system was continued in the 2005-2010 FMP with refinements to improve its application on the Forest. The Forest is divided into three distinct management zones whereby 60% of the Forest is managed using the Caribou Guidelines<sup>19</sup> (Caribou Management Zone), 12% is managed under the Moose Guidelines<sup>20</sup> (Moose Management Zone) and the remaining 21% is the "Moose-Caribou Integration Zone" (note the remaining 7% is in parks). The Moose-Caribou Integration Zone "...represents the portion of the Armstrong Forest that is located north of the "Caribou Line" which supports cover types of limited value as caribou habitat and contains very limited caribou presence" (2005-2010 FMP) and is managed under the Moose Guidelines. This zone is further subdivided into two sub-zones; one that is well suited to active moose management due to the

<sup>19</sup> MNR. 1999. Forest Management Guidelines for the Conservation of Woodland Caribou: a Landscape Approach. 69 pp.

<sup>20</sup> MNR. 1988. Timber Management Guidelines for the Provision of Moose Habitat. 10 pp. + Appendices.

prevailing complex pattern of cover types (MZ), and one that is well suited to a modified form of moose management due to a higher conifer component (CZ).

The Moose-Caribou Integration Zone was developed using professional judgement to design for the Armstrong Forest a management system based on knowledge of wildlife species and their use of forested habitats, and the forest ecology of the Forest. Further refinement of the three-tiered management system for the 2005-2010 FMP exemplifies continuation of the adaptive management process used in its original development. The audit team assigns a best practice to the development, application and continued refinement of the three-tiered management system.

**Best Practice 1: The planning team is commended for the refinement and use of the three-tiered management system for the 2005-2010 Forest Management Plan, as originally developed for the 2000-2005 Forest Management Plan.**

The SEIM analysis was completed and is included in the FMP as required. However there is no evidence to suggest that the results of the model were ever reviewed by the planning team or the LCC. In addition, the SEIM outputs are so general that meaningful conclusions at the forest management unit level cannot be made. Better analysis should be provided to the planning team to allow for the effective analysis of socio-economic impact of the decisions being made. MNR should consult with the Ministry of Northern Development and Mines-Regional Economic Development Branch for assistance. There is an internal protocol between these two Ministries to address the provision of social and economic analysis and interpretation in support of forest management planning.

### 3.3.7 Operational Planning

#### Area of Concern Planning

Area of Concern (AOC) prescriptions were prepared in accordance with provincial direction and are documented as required. AOCs were prepared and are documented either as generic, as groups of AOCs with a common value(s) and a common prescription, or individually where the generic prescriptions do not address the prevailing conditions or where additional rationale for the prescription is required. Examples of generic AOCs prescriptions include moose aquatic feeding areas and raptor nests. Numerous individual AOCs were developed as part of the 2005-2025 FMP to protect a suite of individual values including tourism lakes where protection of the aesthetics was implemented through viewscape reserves and where remoteness was protected through special temporary road zones around the water body of concern. In addition, discussion of AOC use and interpretation is included with AOC prescriptions as part of the FMP Supplementary Documentation.

#### Silviculture Planning

The 2005-2010 FMP includes a very comprehensive set of approximately 108 ecosite-based silviculture ground rules (SGRs); each contains one or more silviculture treatment packages (STPs) based on available treatments. Preferred STPs, conditions of 'conditionally recommended' treatments, and exceptions to silviculture guides are identified in the SGRs. In addition, the FMP text fully describes all facets of the SGRs.

The SGRs in the 2005-2010 FMP are an improvement over those in the 2000-2005 FMP. Examples of improvement are the changed format and the new naming convention (e.g. SPCtoSPCIntensive1C). These revisions make the SGRs more intuitive and user-friendly; unfortunately, some utility and important linkages are also lost in the update.

Target stocking is removed (although the provincial minimum stocking of 40% is maintained). In this case, the important connection between the SGR (the "tool kit" for meeting most forest-related targets) and the plan objective "*to maintain/enhance forest productivity*" is lost.

**Suggestion 7: Norampac Inc. should consider re-instating target stocking or updating the measure of site occupancy in the Silvicultural Ground Rules to correlate with the Well-Spaced Free-Growing Regeneration Manual<sup>21</sup> (i.e. list the target and minimum number of well-spaced free-growing trees).**

Some acceptable species listings in the 2005-2010 FMP SGRs are limited by present forest unit species composition averages. For example, the SGR 'SPCtoPJCExtensiveC' depicts an extensive treatment (i.e. natural regeneration) from a spruce dominated stand condition (SPC) to an almost pure jack pine condition (PJC) on coarse soils. In this case, jack pine is listed as the crop species and only poplar is allowed as an acceptable species (since it is the only other species in the present PJC forest unit description). In other cases, the acceptable species list (or desired future forest unit) does not take into consideration the original forest unit composition. For instance, the SGR 'BFMtoPOHExtensiveC' does not have an allowance for balsam fir and the SGR 'CEUPtoPOHExtensiveF' does not allow for cedar; even though the original stands were dominated by balsam fir and cedar respectively. Obviously, it does not make sense to overlook the species that presently dominate sites, especially when extensive treatments are planned. In most cases, following depletion (including harvest activities) pre-harvest species maintain a significant presence on site as advanced growth or they re-emerge through vegetative means or seeding. This ability to regenerate is known as "site legacy".

In summary, if the acceptable species listings are not revised, some of the stands managed under these SGRs will likely not be assessed as a silviculture success in the future although successful on the ground. As a result, the audit team makes the following suggestion.

**Suggestion 8: Norampac Inc. should revise the Silvicultural Ground Rules such that acceptable species lists include those species that have a high potential for being on site post-harvest. These adjustments must also be reflected in post harvest succession rules in SFMM and should be consistent with silvicultural objectives.**

One silvicultural exception is noted in the 2005-2010 FMP – full tree logging on very shallow-soiled sites. This exception is rationalized and a monitoring program is included in the plan. The monitoring program consists of collaborating with the Centre for Northern Forest Ecosystem Research regional shallow soils study.

Renewal support requirements have been minimally documented in the 2005-2010 FMP. Important information regarding method of seed collection or procurement of seed and seedlings is absent from the FMP. In addition, although planting of white spruce and red pine is planned, seed requirements for these species are not considered in the plan.

**Suggestion 9: Norampac Inc. should include all required renewal support information in future forest management plans.**

In the 2005-2010 FMP information regarding the program for assessments of regeneration success is very general. For example, "*assessments will be conducted as part of the annual operations and will be performed according to the latest assessment guidelines and documentation*". This does not fulfill the requirements of the 1996 FMPM that "*the descriptions of the program, and the methods to be used, should include information on when monitoring will be carried out; the duration of monitoring and how the results of monitoring will be documented and reported*". Other requirements of the FMPM regarding monitoring are also not present. The discussion of the relationship between the planned harvest area and the area expected to regenerate within the acceptable time periods is not, for example, included.

<sup>21</sup> MNR. 2005. Well-spaced Free-growing Regeneration Assessment Procedure for Ontario. NWSI Technical Report TR-000. 33 pp. + Appendices.

**Recommendation 13: Norampac Inc. must ensure that all required text regarding the monitoring and assessment program is included in future forest management plans.**

Harvest Planning

Selection criteria for areas eligible for harvest operations are consistent with the eligibility criteria found in the 2005-2010 FMP. In addition to those identified for harvest, five selection criteria were identified for renewal and tending. Public input has been integrated into the selection process as is evident from the public consultation summaries found in Appendix K of the 2005-2010 FMP. The 2005-2010 FMP has contingency areas identified and clearly explains that these areas will be used as replacement. Overall contingency area represents 5.3 months of harvest area (based upon total harvest area for the five-year term). These aspects of harvest planning met the FMPM requirements. The wood supply commitments and the forecast of wood utilization by licensee have been addressed in Table FMP-24 as well as within the Analysis Package found in Appendix AI (Part 2, Section 4) of the 2005-2010 FMP.

The operational planning successfully matches the forest unit area distribution determined in the SFMM analysis of the selected management alternative. There is some substitution of age classes as a result of spatial constraints such as caribou mosaics and access.

Roads Planning

Access planning for primary and secondary roads was comprehensive and meets the requirements of the FMPM.

**3.3.8 Plan Review, Approval**

Overall the review and approval of the 2005-2010 FMP followed the process as outlined in the 1996 FMPM. The required alterations were well done and professional. The plan author had no complaint with the majority of the required alterations or the timeliness. The plan author addressed all required alterations either by incorporating the required changes or discussing changes with specific reviewers and coming to agreement on the appropriate change.

In total there were 1102 alterations of which 663 (60%) were identified as "Required", the remainder were split between "Editorial" and "Suggestion". There were 19 reviewers divided between the District, Region and Planning Team. All but two were part of the identified support team for the plan. Planning team members accounted for 47% of the overall comments and 40% of the required comments. The Region accounted for 33% of the required alterations and three of the regional reviewers accounted for 75% of those comments. Table 4 provides a summary of findings.

The audit team is asked to determine whether the dual role of plan advisor or planning team member and that of reviewer was beneficial to the review of the FMP. While there is little doubt that the involvement of these individuals resulted in a better plan than would have been produced had they not been involved, there is room for improvement. The comments were reviewed for content and plan section and found to be appropriate. The concern then becomes a function of the number and origin of the comments. In the experience of the auditors, the number of alterations is not out of the norm for FMPs in this region. However, 1,102 comments represent a significant workload both to generate the alterations and to address them.

The fact that nearly half of all alterations came from the MNR members of the planning team suggests that they were not as effective in working on the development of the plan as they could have been. In some cases, the reviewer should have been the author of the section being reviewed. The planning process has become so complicated that it is no longer possible for a single plan author to produce a plan that will meet the approval of all those who review it. In fact, planning team members should probably not be part of the formal review as they should be focused on contributing to the production of the plan being submitted.

Table 4. Summary of alterations for the 2005-2010 Armstrong Forest FMP.

Reviewer	Comment Type				% of Total	% of Required
	Comment	Editorial	Required	Suggested		
1			2		2	0.2
2			3		3	0.3
3			5		5	0.5
4			6		6	0.5
5		4	6		10	0.9
6			7	5	12	1.1
7	2		16		18	1.6
8	1	2	16		19	1.7
9	2	9	5	4	20	1.8
10		2	18	3	23	2.1
11	3		20	8	31	2.8
12	11	2	22		35	3.2
13	9	5	40	2	56	5.1
14		2	52	3	57	5.2
15			50	17	67	7.5
16			100	8	108	15.1
17	13	18	86	13	130	11.8
18	17	51	76	26	170	15.4
19	15	155	133	27	330	29.9
<b>Total</b>	<b>73</b>	<b>250</b>	<b>663</b>	<b>116</b>	<b>1102</b>	<b>100</b>
	<b>7 %</b>	<b>23 %</b>	<b>60 %</b>	<b>11 %</b>		

The fact the three regional reviewers generated 75% of the Region's comments and these same individuals were part of the support team suggests there is room for improvement in the interaction of these positions and the planning team during the plan development phase. There is also an opportunity to review training of planning team members and to re-evaluate the approach to planning team support using the review comments as a guide.

Given that both the MNR and the Company have limited financial and human resources it would seem prudent that every effort be taken to reduce the number and significance of alterations identified through the review process. An analysis of required alterations of this FMP and others should provide the basis for a review of the planning processes.

**Suggestion 10: The Ministry of Natural Resources should evaluate the roles, responsibilities, and training of forest management planning and review teams to reduce the number of required alterations.**

Part of the onus for reducing the work effort associated with the review and subsequent addressing of alterations lies with the company. Provision of time within the schedule for an in-depth review of the plan prior to submission should result in a reduction in requests for alterations.

**Suggestion 11: Norampac Inc. should develop procedures to ensure a thorough plan review prior to submission of the next draft forest management plan.**

### 3.3.9 Plan Amendments

The master list of amendments and amendment records were found to be current and accurate at both Company and MNR offices. MNR had not met the requirement to send amendments to MNR Forest Management Branch and a location in Toronto as provided by MNR. Staff cited workload as the primary reason for not completing this task. There is a strong belief that these updates are seldom used and the

effort to compile and send them is non-productive. It is, however, a requirement of the FMPM. Perhaps consideration can also be given to the submission of amendment information in electronic formats.

**Recommendation 14: The Ministry of Natural Resources must ensure that all amendments are distributed to the required locations and within the required timelines.**

**Suggestion 12: The Ministry of Natural Resources should review the requirement to send amendment documentation to Forest Management Branch and a location in Toronto, and in particular, the format of such documentation.**

During the implementation of the 2000-2005 FMP there were 65 amendments: 61 were categorized as administrative and four were categorized as minor (Table 5). There were no major amendments during the implementation of the FMP. All of the minor amendments were in response to the "snowdown" event and the salvage of impacted areas. LCC meeting minutes indicated that amendments were reviewed as required.

Table 5. Summary of amendments to the 2000-2005 Armstrong Forest FMP by reason and category.

Reason	Amendment Categorization			Total	Percent of Total
	Administrative	Minor	Major		
Area of Concern	22			22	34
Water Crossing	6			6	9
Operations	10			10	15
Roads	8			8	12
Salvage		4		4	6
Silviculture	8			8	12
New Values	7			7	11
<b>Total</b>	<b>61</b>	<b>4</b>	<b>0</b>	<b>65</b>	<b>100</b>

As new values were identified, amendments were prepared to properly protect values. Most of the administrative amendments (45%) were related to changes in streams that were previously unmapped, never existed or were found to be in a different location. Both the company and MNR have recognized that the 2004 FMPM provides a more efficient mechanism to deal with these types of situations and are implementing them in the 2005-2010 FMP. This should significantly reduce the number of amendments during the next term.

The one area for improvement with respect to amendments is the time taken for approval. Based on approval dates in the master list, administrative amendments took an average of 37 working days or a little over seven weeks from submission to approval (Figure 8). While there appears to be some improvement in the last two years of the plan, approvals still take more than four weeks. The fact that many of the amendments dealing with new or changing water values does not appear to be a factor.

**Suggestion 13: The Ministry of Natural Resources should review the approval process for amendments to identify ways of reducing approval times.**

Involving Norampac in this review may identify improvements in production of amendments or provision of information that would make the process more efficient.

### 3.3.10 Contingency Plans

There were no contingency plans during the period under review.

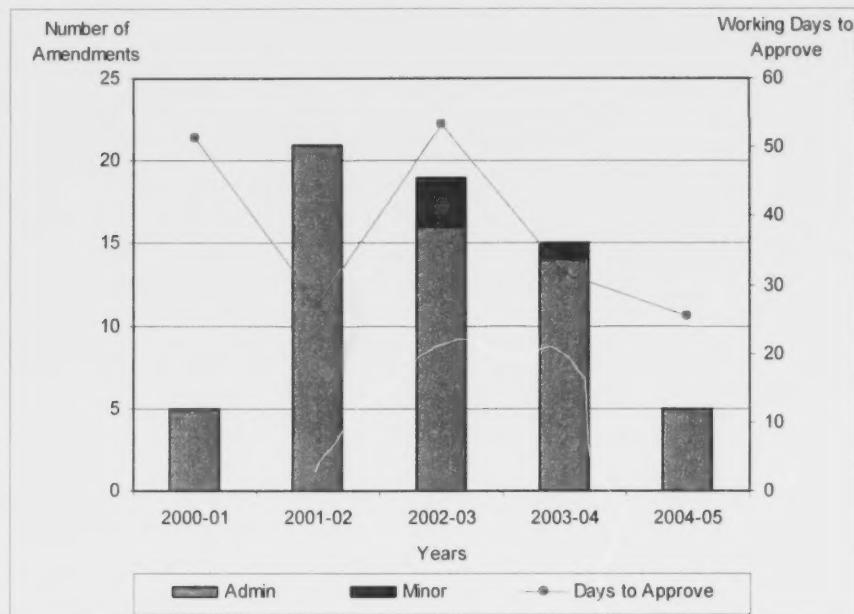


Figure 8. Amendment frequency by year for the 2000-2005 Armstrong Forest FMP.

### 3.3.11 Annual Work Schedules

Annual work schedules were completed, certified by an R.P.F. and fulfilled the FMPM requirements. The planned operations were consistent with the approved FMP. An Annual Compliance Schedule of Action that outlined scheduled compliance activities is included with each AWS as required. Planned compliance activities for each overlapping licensee are also included.

The audit team discovered an unusual approach to dealing with a minor trespass that surfaced during the review of AWS documentation. The compliance issues were properly recorded. Rather than fine the Company, the MNR dropped stands allocated for harvest in the following year's AWS as both a "punitive" measure and to improve caribou habitat conservation. The proper amendment procedures were followed. As far as caribou habitat conservation is concerned, one would assume these trade-offs would have been dealt with during the development of the FMP. Of concern to the audit team is that AWS approvals may become a punitive lever that usurps due process and senior management involvement under Section 58 of the CFSA.

These AWS changes occurred twice in the five-year term and are in part a reflection of a dispute between an Overlapping Licensee and MNR over the interpretation of Section 58 of the CFSA. These irregularities are not viewed by the Company or the District Manager as a concern provided they are not repeated in the future. The Company would take strong exception to this practice if it should continue.

**Suggestion 14: Corporate Ministry of Natural Resources should review the circumstances related to the change in allocation in lieu of fines in the context of the existing regulatory framework and adjust procedures or regulations accordingly if or where determined to be appropriate.**

Forest Operation Prescriptions (FOPs) in the 2001-2002 through 2005-2006 AWSs consist of a statement signed by an R.P.F. that certifies that scheduled harvest, renewal and maintenance operations are in accordance with the FMPM requirements and are appropriate for the site conditions encountered as they are currently known. This text is slightly altered in the 2005-2006 AWS to include access operations. FOPs also consist of stand listings in each AWS that contain STP/FOP codes for all stands planned for

harvest, site preparation and renewal and tending operations. As a final step, to allow a spatial definition of forecast operations, the codes are linked to the Areas Selected for Operations maps.

Detailed information regarding FOPs is also included in each AWS. For example, “*a Forest Operations Prescription is a site-specific, integrated set of harvest and renewal and tending activities which is developed before any operation can commence on a particular site. Forest Operations Prescriptions in the AWS have been developed based on professional judgment, past experience on similar sites and local expertise of Domtar forestry department technical and professional staff*”. In 2003-2004 and subsequent AWSs the following statement was added to the text above: “*FOPS not contained in the AWS will be appended to the AWS upon completion!*”. In addition, as the current FRI for the Armstrong Forest does not contain ecosite information, Norampac includes two-digit site condition modifiers to the FOP codes as a proxy. The first digit of the codes indicates the soil type and the second digit indicates the anticipated competition level.

FOPs have been completed as per the 1996/2004 FMPMs and are consistent with the SGRs in the 2000-2005 and 2005-2010 FMPs as they are based on them. Also, FOPs were completed in all AWSs prior to applicable operations commencing on site and when changes were required, the AWS was revised accordingly.

The audit team did discover an area where unplanned tending operations occurred on a few naturally regenerating poplar stands. Norampac staff did not appear to have previous knowledge of this activity and thus neither the FOP nor the AWS had been changed at the time of the field audit. The audit team is confident that Norampac will complete these tasks in a timely manner and do not make a recommendation herein. This unplanned tending is also discussed in Section 3.4.3.

## 3.4 Plan Implementation

### 3.4.1 Areas of Concern

During the field examination portion of the audit, the audit team observed a suite of AOC prescriptions including several Moose Aquatic Feeding Areas (MAFAs), reserves along water bodies to protect tourism interests, fish habitat, water quality reserves, and nesting sites. The audit team noted compliance with the prescriptions as described in the relevant FMP, except in instances where compliance inspections had already reported inconsistencies. Prescriptions related to temporary road zones around Caribou Lake were adhered to. For example, the Company dragged slash and unmerchantable timber across roads once operations were complete.

### 3.4.2 Harvest

The harvest profile matched the allocations and followed the selection criteria in terms of forest unit and age classes. The harvest closely followed planned areas at the block level. Observations of harvesting operations by the audit team were consistent with compliance inspections (FOIRs) that recorded frequent but relatively minor compliance issues:

- Several instances of wasteful practices (Figure 9);
- Inconsistent slash management until 2005 (Figure 10);
- Problems with tree retention (number/size) (Figure 11);
- Isolated cases of site disturbance (Figure 12);
- Opportunities to increase yields through better utilization;
- Many instances of stranded processed wood that is later recovered but inhibits slash burning and renewal.

There are several reasons for the above problems. The Forest's fire history has created many high density stands (trees per hectare) but trees on average have small diameters. This could lead to wasteful practices, breakage during harvest, and problems with wildlife tree retention.



Figure 9. Example of a wasteful practice (Block 315).



Figure 10. Example of slash management problems (Block 533).



Figure 11. Example of snag tree retention meeting guidelines for quantity but not size.



Figure 12. Example of site disturbance, note the excessive rutting (Block 533).

When the audit team observed post-harvest stands there was evidence from examining stumps that a sufficient range of tree size was present pre-harvest to comply with the tree retention guidelines. This suggests that the tree retention problems can be corrected with better operator training or incentives. Greater care or different equipment choices can also reduce breakage.

The slash management program was largely ineffective until the last year of the audit period. During that year some specialized equipment was introduced to pile the slash leading to dramatic improvements (Figure 13). There remains a considerable area where slash piles disrupt forest renewal and in some rare instances may pose a fire hazard (Figure 14). The audit team is aware of another SFL holder that recovered older slash piles.

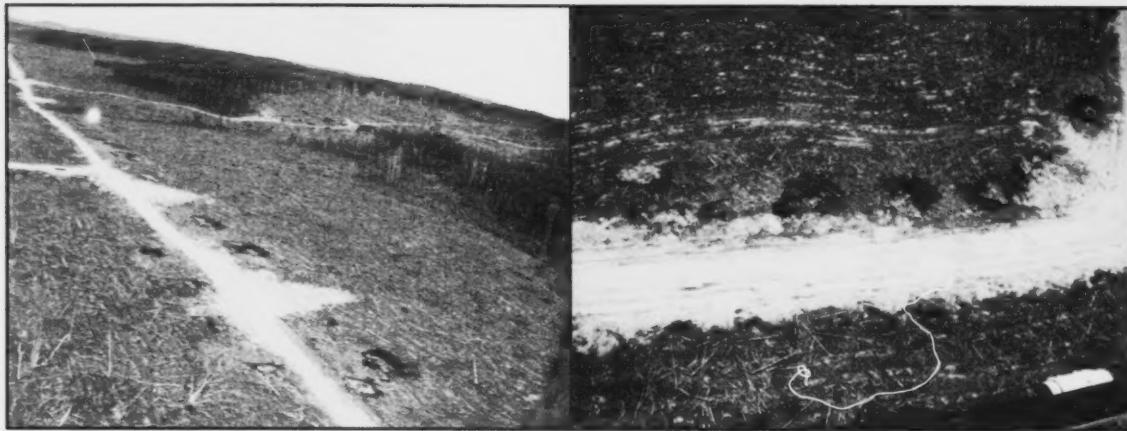


Figure 13. Aerial photos showing examples of good slash management (Block 531).



Figure 14. Note the area taken up by untreated, older slash piles in the regenerating forest.

**Suggestion 15: Norampac Inc. should examine options for recovering productive forest area from older slash piles.**

Many stands and blocks were a mix of salvage and conventional harvest because of the "snowdown" event of 2001. Many trees were uprooted and broken, piles of debris, high stumps and scattered stems resulted which created a difficult setting for harvesting and harvest compliance. Although the problems with harvest utilization and compliance are common, the magnitude of the problem on most sites was relatively minor when the site and stand conditions are considered. Nonetheless, even with these circumstances, the audit team sees opportunities for improvement as noted in the compliance reports and hence offers the following recommendation.

**Recommendation 15: The Ministry of Natural Resources and Norampac Inc. must continue efforts to improve harvest compliance with the regulations as they relate to utilization and tree retention.**

During the field visit the audit team expanded the audit sample, at the request of MNR, to include two blocks that had been allocated to Whitesand First Nation and T-Chains, an independent operator, through overlapping licenses. These sites are not representative of operations by BFPL or Whitesand First Nation but were deemed by MNR to be an important issue.

The licenses reflect the commitment by the District Manager to address local concerns related to sharing in the economic benefits of forest management. Unfortunately, the harvest operations were poorly executed and the fate of the unused timber on the sites remains uncertain. Both sites (Block 510 and Block 422) had extremely poor utilization and abundant wasteful practices.

Block 422 had merchantable timber remaining on site for two years and the area has been site prepared and planted (Figure 15). This block is on a sandy outwash plain and hence the chances of site damage are limited.



Figure 15. Example where merchantable timber was left on site (Block 422).

Block 510 has deep silty soils supporting high value and high volume stands of poplar and jack pine. These site types can be damaged by erosion or compaction. Excessive grubbing, large landing areas, poor road construction practices and poor stream crossings are causing environmental harm, contrary to the forest management guidelines and FMP objectives. Operations suddenly ceased in 2004, presumably over contractual disputes, leaving several hundred cubic metres of volume on the ground (Figure 16).

Fortunately, the two blocks represent a small fraction of the total harvest area. Evidently enforcement of the CFSA is different for these operations compared to the majority of operations on the Forest and this was confirmed through a follow up interview with the District Manager. This difference of enforcement recognizes the need for some licensees to build the capacity to properly execute forest harvesting operations (i.e. T-Chains) and further support Whitesand Forestry economic development.

One of the obvious drawbacks of this enforcement pattern is that preferential treatment toward members of Aboriginal communities (T-Chains and Whitesand Forestry) is that it will be seen by many as unfair and could be used as a lever to lower standards on other forest operations. There is no evidence of the latter but obvious social concern for the former.

The question of fairness is a matter of perspective. Many local residents and the Aboriginal community in particular lag far behind the national average in every socio-economic indicator. Are the current circumstances fair, and, if not, can they be remedied with preferential treatment? The question is national and cross-sectoral in scope and hence cannot be resolved in a forest planning and auditing setting.



Figure 16. Stranded jack pine bundles (upper left); Excessive grubbing (lower left); Excessive landing area and unutilized wood (right).

The MNR will not issue a new license until merchantable wood is removed from the site. Nonetheless, the landings, roads and crossings require measures to protect the site from further erosion. In addition, the forest management issues related to these problems can be partially addressed from a risk management perspective. Allocating lower value and lower risk stands to high risk operators is a risk management strategy worth developing further than currently practiced. Mentoring, joint ventures and more frequent compliance inspections (see Recommendation 20 in Section 3.4.3) are additional strategies that could have merit.

**Recommendation 16: The Ministry of Natural Resources must initiate actions to mitigate site damage in Block 510 and to fully utilize the harvested wood.**

**Suggestion 16: The Ministry of Natural Resources and Norampac Inc. should take into account the capacity of operators in allocating areas for operations as part of a well defined risk management strategy within the compliance plan.**

### **3.4.3 Renewal, 3.4.4 Tending and Protection and 3.4.5 Renewal Support**

The audit team viewed a sampling of renewal, tending and renewal support activities from those areas where activities were conducted during the five-year term of the audit. The sample included examples from each type of activity and from each of the five years being audited to assess the success of the prescriptions.

Renewal treatments completed during the audit term consisted of natural and artificial regeneration. Natural regeneration of hardwood (poplar) dominated uplands and spruce lowland stands (using careful logging around advance growth (CLAAG)) were the two main natural regeneration methods observed. Artificial regeneration methods observed consisted of mechanical site preparation (mainly power disk trenching) and manual planting of spruce and/or pine seedlings or aerial seeding of jack pine. Artificial treatments tended to occur on the majority of upland conifer or mixed wood stands. The field audit also included viewing older plantations that were treated with a bullhog system which mulched damaged portions of the stands significantly affected by the October 2001 "snowdown" event (Figure 17). The area was effectively treated. The audit team noted that the "bullhog" project was approved by the Forestry Futures Committee and funded from the Trust Fund.

For older artificially treated areas, and sometimes areas naturally regenerating to conifer, chemical release of conifer from hardwood competition was also a common prescription during the audit term. This was normally completed through aerial application of herbicide using, in the first few years, fixed-wing and later, rotary-wing aircraft. Where aerial spray was not the preferred option to reduce competition due to a combination of public and environmental concerns as well as operational limitations such as small block size, various ground treatments were used. Ground tending treatments included basal bark spray, manual tending with brush saws (with or without herbicide attachment), and manual spray using back pack sprayers.

Renewal support during the term was limited to the production of spruce and pine seedlings and pine seed for aerial application. There were no plans to complete tree improvement work during the plan term and none was completed. Most of the stock was produced at a local nursery or a nursery in Thunder Bay while stock was assessed by an independent stock testing contractor. Stock assessments and the field audit determined that stock quality was generally good with some variability, particularly for stock produced earlier in the audit term (Figure 18).

Of note is that Norampac uses non-local seed to produce white spruce and red pine seedlings. The genetic variation of red pine is such that non-local sources will likely grow as well as local seed sources, but the same is not true for white spruce. Although the white spruce is growing well at this time, some additional monitoring may be warranted.

**Suggestion 17: Norampac Inc. should monitor the health of the white spruce plantations on a periodic basis and renew its white spruce seed sources to ensure seedlings are properly adapted to local conditions.**

Most renewal and tending prescriptions completed during the audit term were consistent with the FMPs, AWSs and ARs. Field site 17, Block 533 was the exception where a few naturally regenerating poplar hardwood stands were sprayed with herbicide. As noted, this appears to have been an isolated incident but is a non-compliance nonetheless.



Figure 17. Area treated with "bullhog" mulching unit.



Figure 18. Good black spruce seedling growing in burned slash.

**Recommendation 17: Norampac Inc. must determine the effect of the unplanned treatment on the pertinent portions of Block 533 and determine if remedial treatments are required to ensure renewal success.**

Most treatments viewed were also appropriate and effective and many areas treated during the audit term appear to be headed towards meeting Free-to-Grow (FTG) targets. Notable exceptions include CLAG prescriptions on sites that had very little advanced growth, particularly Block 400, and tending treatments that did not sufficiently reduce hardwood competition (e.g. Blocks 210 and 500) – each of these exceptions is discussed separately below. Other sub-standard treatments included the following:

- Although site disturbance was minimized on all sites viewed, disk trenching site preparation completed during the term was not always effective in exposing mineral soil. This is mainly a result of site preparation equipment being hindered by logging debris, residual trees and excessive duff.
- Some upland sites were planted to spruce but overtaken with pine making it difficult to determine how the prescribed treatment would lead to the desired future condition (Figure 19).
- Seeding application appeared to be sub-par, particularly along the periphery of treatment areas.

In the case of the CLAG prescription applied to Block 400, there are vast areas with little to no advanced growth where the distance to a seed source is large and seedbeds are unsuitable for seeding (Figure 20). A pre-harvest on-ground inspection would have determined the inappropriateness of this preliminary prescription. Portions of this block will need a very long time to naturally regenerate and will likely still have low stocking. Norampac has an operating guide for careful logging practices, which indicates operators retain group seed trees on sites where there is insufficient advanced growth. This direction is not being followed (Figure 21). In addition, in this instance, direction in the FMPM that FOPs be completed according to actual field conditions is not being complied with as the site was not a typical lowland site but rather an inundated upland site with lowland characteristics. As a result, the audit team makes two recommendations, the first specific to Block 400 and the second to cover all operations.

**Recommendation 18: Norampac Inc. must assess Block 400 in the near future to determine if artificial treatments may be required to meet regeneration standards within the time allotted in the Forest Management Plan.**

**Recommendation 19: Norampac Inc. must ensure that Forest Operation Prescriptions are updated to reflect actual on-the-ground conditions.**



Figure 19. Planted black spruce and ingress jack pine.



Figure 20. Portion of Block 400 showing poor seed bed and little advanced growth.



Figure 21. Portion of Block 400 with no apparent seed source.

Tending was not always effective and several aerial herbicide treatments did not sufficiently reduce competition over the entire treatment area, even one or two years following the treatment. On the other hand, the necessity for spray was not demonstrated in all cases. This point is discussed further in the Section 3.6. Although there were several stands which were identified by Norampac for re-treatment of herbicide, the contractor has never been required to re-apply treatment. Lack of formal post-spray assessments and contractual quality controls do not allow for the immediate detection and re-treatment of these areas (see Suggestion 21 in Section 3.6).

Some stands that were already declared FTG were also sprayed during the term. While this is an innovative approach to ensure that the desired future forest condition is achieved in some of these areas,

one area seems to already have a full conifer composition (Field site 1, Block 137). Beyond this, there is no procedure for re-assessing areas already declared FTG. This is discussed in Section 3.6.

Basal bark treatments were also noted to have very sporadic results consisting of missed areas, poor application, poor definition and delineation of spray area.

There is an evident gap between forecast and actual levels of tending due to contractor difficulties and on-going dialogue with Whitesand First Nation. According to the Trend Analysis Report, in the 2000-2005 FMP term, 12,870 ha were planned and 5,852 ha were completed (45%). If this trend continues, Norampac may have difficulty in meeting the desired future forest condition described in the 2005-2010 FMP, as hardwood species quickly re-establish on sites planted, seeded and/or naturally regenerating with conifer.

Bearing in mind the considerable opposition to herbicide from locals, the desired future forest condition dominated by pure conifer stands, and the fact that Norampac would like to reduce the application of herbicide on the Forest, demonstrating effective and efficient herbicide use should be a Company priority. This reality will not change until an environmentally-benign, economic alternative to herbicide is available. Alternatively, Norampac may decide that the forest composition objective in the 2005-2010 FMP related to maintaining or increasing the conifer-dominated stands is not achievable. Several suggestions are made in Section 3.6 to aid in increasing the effectiveness and efficacy of the tending program.

There were also a number of non-compliances related to renewal and tending operations during the audit term. These included:

- a few cases of not following the CLAAG prescription – areas were clear cut instead;
- one case of planting an area that had already been seeded (this occurred in 2004). It should be noted that this also occurred in 2005 but the trees were removed and planted in a properly designated area;
- manual tending was completed instead of the ground tending prescribed;
- one site preparation trespass where naturally regenerating poplar was site prepared.

Issues that led to the non-compliances include: a high turnover of contractors, a large number of contractors as a result of high turnover, the inexperience of some contractors, the use of temporary staff for supervision, and a reliance on BFPL staff for conducting the supervision of large components of the renewal program.

To reduce the chance of similar non-compliances in the future, Norampac has added training and updated contractor start-up packages by adding geographic information system (GIS) shape files. These efforts will likely have the desired effect of reducing future non-compliances. However, the number and varied nature of the non-compliances that occurred during the term, combined with the non-compliance discovered by the audit team in a random sampling, is a concern.

The audit team believes that the amount of on-the-ground presence by the SFL holder is not adequate to properly implement the renewal and tending program detailed in the 2005-2010 FMP. According to personal interviews, the Norampac Forester and Technician spent, on average, two to three days per month and two days per month, respectively, on-the-ground on the Armstrong Forest. In addition to this, temporary staff was used to monitor silviculture projects and other renewal implementations during the audit term.

Some of the findings associated with inconsistent slash management, improper tree retention and wasteful practices could also be a result of insufficient field presence by the SFL holder and management group (see Section 3.4.2). As a result, the audit team makes the following recommendation.

**Recommendation 20: Norampac Inc. must ensure adequate human resources are dedicated to Forest Management Plan implementation on the Armstrong Forest.**

### 3.4.6 Access

Access planning for primary and secondary roads was comprehensive and met the requirements of the FMPM. All roads examined by the audit team were placed according to the plan or moved through the amendment process. Roads were properly built and maintained. Improvements and maintenance under agreement funding were verified against the invoices and found to be acceptable.

During the field portion of the audit, the audit team examined numerous water crossing installations and removals with rehabilitation that had been completed during the term. Most installations and removals were found to be carefully executed and met guideline requirements. Figure 22 presents examples of these installations and removals.

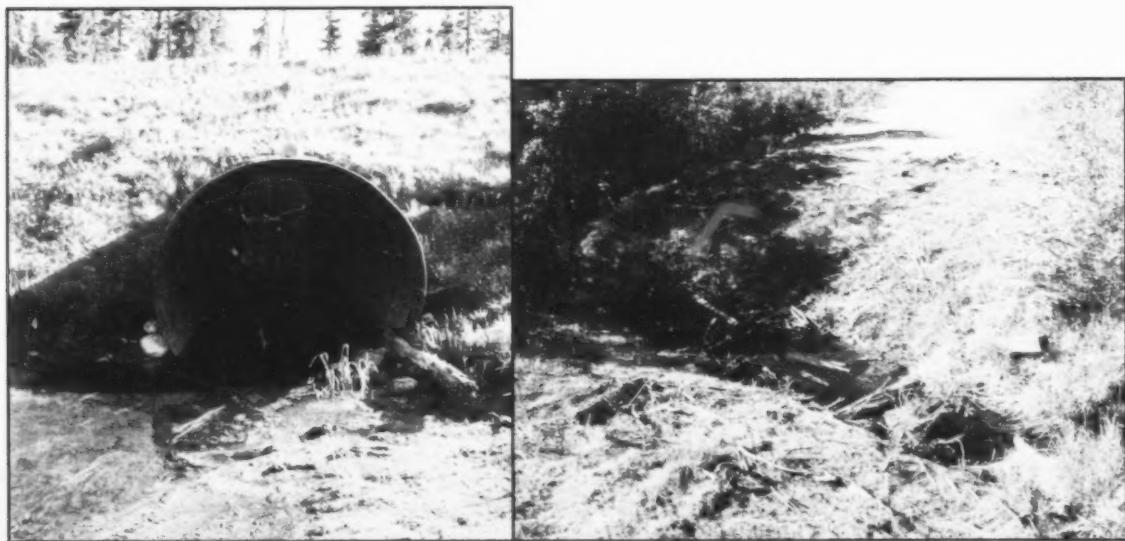


Figure 22. Examples of proper water crossing installation and removal.

In several instances, however, improvements could be made to slope angle, stabilization, and in road approaches to water crossing installations. Where water crossing installations are likely to cause negative impacts to water quality and flow, improvements must be completed. In some cases, road widths had been increased directly on top of a culvert, thereby effectively increasing the bank slope and decreasing slope stability. As stated this was noted infrequently, the majority of water crossings viewed were satisfactory, hence the audit team believes only a suggestion is warranted.

#### **Suggestion 18: Norampac Inc. should ensure that all water crossings are properly installed.**

The majority of water crossings viewed were located to reduce environmental impacts. The sample area included crossings where the Company's requests for alterations had been denied by the MNR. In the first instance, the company wished to avoid a crossing and access the remainder of the harvest block through a moose deferral block. The second instance was a request to move a large diameter pipe 100 metres from a poorly defined stream channel to a better defined stream channel.

The audit team found the Company's requests were reasonable given the observed field conditions and the potential impacts to aquatic ecosystems from water crossing installation and maintenance. The audit team found that the MNR and the Company worked well in most instances but these two situations deserved some consideration. The culvert installation appears to be an isolated incident but the Moose Deferral Area is supported by the MNR's approach that the impacts on the terrestrial ecosystem may, in certain situations, be greater in the deferral area than are the impacts to the stream from installing a

crossing. The audit team questions whether perceived impacts to terrestrial ecosystems warrant the choice of installing a water crossing rather than locating a road through unallocated forest.

Upon written request from Norampac, MNR provided a decision-making rationale to reduce uncertainty for similar requests. According to the MNR District office there were two important factors in the MNR's decision-making process. Firstly, negative impacts associated with a properly installed water crossing are in most cases considered by the MNR to be relatively minimal and generally short-lived. Immediate and long-term impacts of properly installed stream crossings should be relatively minimal. Secondly, the real understanding of the impacts of roads through terrestrial ecosystems (unallocated forest parcels within depletion blocks) is considered by the MNR to be poor, *"but of significant concern in heavily disturbed landscapes to warrant special consideration"*.

The opinion of the MNR District office is that the concern for environmental impacts of roads in moose deferral areas may be a more important consideration than the shorter term or controllable environmental impacts of crossing a stream. Other MNR District offices might offer a different opinion. The audit team sees this uncertainty as leading to subjective judgments concerning the ranking of environmental values without the science to support decision making. To reduce the uncertainty the following suggestion is offered.

**Suggestion 19: The Ministry of Natural Resources should develop a clear, science-based and balanced approach to provide direction for the location of branch roads where alternatives involve impacting the integrity of values.**

The development and use of aggregate pits is a vital component of forest road construction and maintenance. Aggregate pit development and use must abide by the Aggregate Resources Act<sup>22</sup> during periods of activity and must be properly decommissioned during periods of inactivity. While most Category 9 and 14 pits examined during the field portion of the audit followed the standards, a number did not, particularly in matters of decommissioning. Figure 23 provides examples of aggregate pits that require further decommissioning work. While Category 14 pits require no permits, Category 9 pits require permits issued by the MNR. Norampac is advised of the pit permits but is not responsible for aggregate extraction and compliance. Norampac is only responsible for the pits that it develops and maintains and, as the SFL holder, Norampac is also responsible to ensure that Category 14 pits are developed, used and decommissioned in accordance with the Aggregate Resources Act.



Figure 23. Pits located on the Armstrong Forest that need decommissioning work.

<sup>22</sup> Aggregate Resources Act, R.S.O. 1990, c. A.8

Pits that are decommissioned according to defined standards pose less of a safety hazard for the general public and are less intrusive aesthetically. With focus on the safety aspect, the audit team directs the following recommendation towards all pits that were inactive during the period of the audit.

**Recommendation 21: The Ministry of Natural Resources and Norampac Inc. must ensure that all inactive aggregate pits are properly decommissioned.**

### 3.5 Systems Support

#### 3.5.1 Human Resources

According to the IFAPP there must be awareness programs which ensure that individuals responsible for implementing any part of the sustainable forest management system have current general knowledge of:

- regulations and legal responsibilities, particularly in relation to their direct responsibilities in sustainable forest management;
- sustainable forest management policies, objectives, and plans, including an understanding of how their own activities influence the successful implementation of the sustainable forest management system;
- contingency plans and corrective actions to be taken in the event of abnormal conditions, incidents, accidents and potential emergency situations;
- progress and accomplishments in implementing the sustainable forest management system; and,
- efforts to identify and incorporate suggestions for improving the sustainable forest management system.

Norampac ensures that forest managers are Registered Professional Foresters in Ontario and supports the continuing education requirements of that designation by allowing employees to attend coordinated training opportunities as they arise. Personal training records are maintained by each employee and on file at the office in Red Rock.

As mentioned earlier in Section 3.1, Domtar has a comprehensive EMS program in place that promotes communication of relevant forest management policies and responsibilities as well as the annual review of that material to incorporate changes and improvements. In addition to the EMS program training, the company also holds AWS meetings regularly throughout the year with each overlapping licensee and contractor in relation to the amount and relative importance of work for which each is responsible. This is an opportunity that is used to convey new information and requirements to those responsible for on-the-ground activities, review any training needs and conduct actual training exercises. AWS meeting agendas and notes were kept on file with each AWS and a review of those documents indicated that the agendas are very comprehensive and cover such topics as:

- Ecosite 12– Full or Partial Stand Harvesting
- Unmapped Streams
- Marten Habitat Guidelines
- NDPEG
- AOCs and Values
- Stick Nests
- Compliance Inspections
- Grading around Water Crossings
- Water Crossing Installation
- Protection of Sensitive Sites
- Bridge Removal.

Apart from the AWS meetings, Norampac maintained an “arms-length” relationship in terms of training for Overlapping Licensees. There is no formal reporting or information exchange process in place between Norampac and BFPL when it comes to training records. However, Norampac staff stated that they have had no problems accessing Overlapping Licensee training records when requested. The audit team did note some instances where the “arms-length” approach to training Overlapping Licensees may have contributed to certain compliance issues. This was discussed in Section 3.4.3 and resulted in Recommendation 20.

Discussions with staff indicated that employees were aware of their duties and appeared dedicated to their work.

The Northwest Region MNR has an employee orientation program accessible to MNR employees through the internal intranet site. At the District level, Performance Development Plans are reviewed annually for each employee; these plans identify training needs and maintain records of training received. Employees have access to a suite of training opportunities related to their professional responsibilities on a regular basis. Interviews indicated that employees were aware of their responsibilities and committed to their work.

Communication between Norampac and MNR was observed to be effective.

### **3.5.2 Documentation and Quality Control**

Documents were well organized and maintained in an efficient manner at the SFL manager's office in Red Rock. Domtar's EMS program is registered to the ISO 14001 standard and document control met the requirements of this standard. The audit team had access to all audit information.

Documentation at the Thunder Bay District MNR office was also maintained in an organized manner. All documents were made available to the audit team on request.

## **3.6 Monitoring**

### **3.6.1 General Monitoring**

The Company's general monitoring program has two elements; silvicultural monitoring and compliance reporting.

#### **Silvicultural Monitoring**

Norampac's silviculture monitoring program for the Armstrong Forest includes the following surveys:

- CLAAG and lowland stocking surveys completed on select stands (the latter were created as a result of the 2001 IFA);
- Planting quality and survival plots. The latter are re-assessed in year two and a sub-sample is re-assessed in year five;
- Post-treatment surveys of ground-tending (normally completed informally);
- Pre-tending assessments; and
- FTG surveys.

Norampac staff complete all assessments except planting quality, which are completed under contract by the planting contractor and/or BFPL staff. Normally pre-tending assessments and FTG surveys are combined into operational blocks which Norampac staff assess by helicopter in the fall (usually in November after leaves have dropped). In the last year of the audit term, contractors were hired to complete a large FTG program (about 4,700 ha) that included ground and aerial assessments. In total, according to the Trend Analysis Report produced by Norampac for this audit, FTG surveys were completed on 11,588 ha (68% of planned) during the audit term; 68% of that was declared FTG. According to Norampac most of the non-FTG area either requires a tending treatment to reduce hardwood component and/or requires more time to reach required height standards.

As noted in Section 3.3, the program for assessments of regeneration success in the 2005-2010 FMP is too general: *"Assessments will be conducted as part of the annual operations and will be performed according to the latest assessment guidelines and documentation."* This text suggests that Norampac will use current assessment methodologies during the term. It was noted that, although available, new

assessment methodologies were not adopted during the term. Specifically, the ground FTG procedure used in 2005 is largely based on the outdated Regeneration Survey Manual for Ontario<sup>23</sup>.

Nonetheless, FTG assessments completed during the term were generally good and it was noted that heights were conservative. However, in some cases it appears that hardwood components were under-estimated. This was also noted in MNR silviculture effectiveness monitoring (SEM) reports. SEM completed by MNR during the audit term included surveying in 2004 and 2005 a portion of Norampac's FTG program. In 2006 MNR also assessed a sub-set of areas already surveyed by Norampac.

As noted, FTG assessments were completed by Norampac in November, during the leaf-off period. This may have caused the slight under-representation of hardwood species noted (completing surveys during the leaf-off period is discussed further below with regards to pre-tending surveys and a suggestion is made).

**Suggestion 20: Norampac Inc. should consider completing aerial pre-tending and free-to-grow assessments during or near the end of the leaf-on period.**

There was also some disagreement between MNR and Norampac regarding the FTG status of some stands. For example, when Norampac deferred a FTG call and scheduled a tending treatment, MNR at times would prefer that the stand be deemed free-growing with a mixed wood composition. In this case the audit team concurs with Norampac, as creating mixed wood stands is not desirable in most cases.

As discussed in Section 3.4.3, herbicide treatments conducted during the audit term were not always effective. For aerial tending projects one possible cause may be under-estimation of competitiveness of sites during pre-tending assessments, which are normally completed in the leaf-off period. Conversely, the necessity for spray was not demonstrated in all cases where spray was planned and/or completed.

Post-tending surveys to confirm project effectiveness are not formally completed by Norampac. Although contracts for ground tending projects contain formal assessment specifications (except the basal bark contract), Norampac completes only informal surveys. For aerial tending no formal assessments are conducted and there are no contractual quality assurances. Therefore, ineffective treatments may not be identified until stands are surveyed for FTG status, several years after herbicide treatment.

**Suggestion 21: Norampac Inc. should formalize assessments of aerial tending projects, add quality control stipulations to aerial tending contracts, and complete formal surveys of ground tending projects, as per contract specifications.**

The auditors are aware of several forest companies that monitor aerial herbicide effectiveness through use of remote sensing and other means. These companies also have quality assurances built into contracts. Normally, when the treatment is deemed to have not been effective, the contractor re-applies the herbicides the following year.

As noted in Section 3.4.3, Norampac sometimes commissions aerial tending for areas already deemed FTG. This normally occurs in stands where a higher conifer composition is desired. Unfortunately, Norampac does not have a procedure for re-assessing these areas for FTG status following these treatments. The audit team believes that formal assessment of these areas should occur. Norampac should produce and follow a procedure to assess the results of these treatments. This is to be included in the action plan for the general silviculture monitoring recommendation given below (Recommendation 22).

Although Norampac has completed CLAAG and stocking surveys of lowland and select upland stands during the 2000-2005 FMP term, no formal procedure to assess natural treatments to conifer upland

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<sup>23</sup> Chaudry, M.A. 1981. Regeneration Survey Manual for Ontario. OMNR, Toronto. 29 pp. + Appendices.

stands exists. The audit team is concerned that reaching the desired species composition and stocking in some of these stands may be difficult. It is noted that Norampac has a formal procedure to complete assessments of natural conifer treatments on select stands on the Lake Nipigon Forest; this should be adopted for the Armstrong Forest to ensure the assessment of these areas.

Rather than becoming overly prescriptive, the audit team provides the following general recommendation.

**Recommendation 22: Norampac Inc. must review its monitoring assessment program to ensure that it is adequate for assessing the effectiveness of all silviculture treatments.**

### **Compliance Monitoring**

On Crown lands, compliance monitoring of forestry activities is a joint responsibility of the SFL holder and MNR. For the Armstrong Forest, compliance planning is led by Norampac with assistance from the Overlapping Licensees. Compliance monitoring related to access, water crossing, and harvest activities have been assigned to the overlapping licensees. For selected silviculture operations compliance monitoring has been assigned to Norampac and the overlapping licensees. The certified compliance inspectors for the various licensees conduct inspections to identify compliance and non-compliance, and report to MNR. Where non-compliance is identified, corrective measures and future preventative measures to ensure improvement are specified. The role of MNR is focused on the regulatory aspects of forest management including monitoring, auditing of industry compliance inspections, assessing non-compliance significance, and determining corrective and enforcement action.

Norampac has prepared Five-Year Compliance Plans as an appendix to both the 2000-2005 FMP and the 2005-2010 FMP. Annual Compliance Plans were submitted as part of each Annual Work Schedule with an Annual Schedule of Compliance Inspections included as an appendix.

The Thunder Bay District MNR prepared a District Five-Year Compliance Strategy Report 1999-2004 as well as Annual Compliance Operations Plans. All of the documents were found to contain minimal information on forestry activities. For example, no inspection targets by management unit (forest) were provided.

The MNR compliance inspections on the Armstrong Forest totaled 44 from 2001 through 2005 (the 2005-2006 Annual Report was not available at the time of the audit). With the field office located a 2½ hour drive away from the Armstrong Forest in Thunder Bay, an MNR presence on the forest is difficult to maintain.

MNR staff are conscientious and have a good understanding of the compliance program. Interviews suggested a level of dissatisfaction with the compliance program and the difficulty for staff to implement the reporting phase of the program given the distances involved and the amount of time required to complete reporting requirements associated with inspections (see Recommendation 20 in Section 3.4.3). To ensure that reports are completed accurately, comprehensively and with sufficient detail to withstand legal contestation, report completion was said to take up to one day per report. Dealing with issues directly on site better served compliance improvement and resolution of compliance issues.

Norampac and BFPL staff also showed a good understanding of the compliance program. BFPL's compliance program had changed during the period under audit. The BFPL compliance program switched from having a dedicated compliance person to assigning compliance responsibilities to operations supervisors and back to a designated compliance person at the time of the audit. Company staff indicated that compliance monitoring had been given more priority and inspections were being completed and reported but a significant backlog of unreported inspections still existed.

Norampac provided a comprehensive suite of materials related to each audit site selected for inspection by the audit team. Included in these materials were compliance reports for those sites. The audit team noted that instances of non-compliance observed during the audit had been noted in compliance reports.

Report submissions by all parties were often late and verification of non-compliances by the MNR was not always completed. The audit team makes the following recommendation to direct all parties to meet required timelines.

**Recommendation 23: The Ministry of Natural Resources and Norampac Inc. must ensure that timelines for reporting under the Forest Operations Inspection Program are met and that all inspections are reported as required.**

### **3.6.2 Annual Reports**

Preparation of annual reports is an integral part of adaptive management. Annual report submissions were made by Norampac to the MNR in accordance with requirements of the 1996 FMPM and the phase-in requirements of the 2004 FMPM. Annual report text provided good summaries of these operations on the Forest for each year during the audit period of review.

The MNR is required under Condition 34 of the Class EA Declaration Order to report on negotiations with Aboriginal communities. The Condition 34 report (formerly Term & Condition 77 Report) was produced for the years 2001-2002, 2002-2003, 2003-2004 and 2004-2005.

While the MNR provides Norampac with the Condition 34 Report to complete their sections, the tabular portion of the report is missing dollar value amounts as well as the number of Aboriginal people employed.

**Suggestion 22: The Ministry of Natural Resources and Norampac Inc. should ensure the value of contracts is included on the tabular portion of the Condition 34 Report. When the number of Aboriginal people employed is available, this data should also be included in the Condition 34 Report.**

### **3.6.3 Report of Past Forest Operations**

#### **1995-2000 RPFO**

The 1995-2000 RPFO for the Armstrong Forest 2005-2010 FMP has a detailed analysis of Table RPFO-6 which includes a discussion of emerging trends and issues associated with the comparison of planned and actual harvest volumes. The text discussed volume commitments that were met and the reasons for commitments that were not met. See Section 3.8 for further discussion on the trends discussed.

#### **Year-Ten Annual Report**

The audit team reviewed the Year-Ten Annual Report which was produced instead of an RPFO to cover the 2000-2005 term in accordance with the phase-in requirements of the 2004 FMPM. The Year-Ten Annual Report was submitted December 6, 2005 for MNR review which was not completed until April 12, 2006. It was revised, resubmitted by the Company on April 18, 2006 and was accepted by MNR on May 5 of the same year.

The Year-Ten Annual Report was found to be very well written and complete. Since this was the first report for this Forest prepared according to the 2004 FMPM, some tables designed to show trends over time have only been partially completed since information from previous terms either was not available or not in a format for inclusion in these tables.

The *Forest Disturbance* section provided a good discussion on the impact the “snowdown” event had on disturbance pattern resulting from the salvage operations that followed. The section concludes with consideration for future plans.

The *Review of Renewal and Tending* section was well done. The Year-Ten Annual Report contains a summary of operations conducted during the FMP term including:

- Amount of each activity completed versus planned and reasons for under achievements;
- A limited discussion of expenditures;
- A discussion of assessments completed;
- A summary of the last IFA; and
- An assessment of the achievement of the 2000-2005 FMP objectives and related recommendations where partial achievement was determined. Recommendations included:
  - Address backlog of silviculture assessments (FTG) early in the 2005-2010 term;
  - Continue discussions with Whitesand First Nation regarding herbicide use;
  - Assess jack pine seeding areas early in the 2005-2010 term to gauge future pre-commercial thinning requirements.

The Year-Ten Annual Report also included the following discussion of harvest/regeneration trends: “*Due to the limited information available for AR-16, harvest and renewal trends are difficult to identify. Trends are also not apparent due to the time frames associated with regeneration assessment as per the Silvicultural Ground Rules (SGRs). This is particularly evident in the spruce forest units which have longer periods between harvest and assessment for regeneration success...as more information becomes available (in future FMP periods), regeneration trends will become more apparent. Based on Table AR-16, preliminary assessment results illustrate a trend towards regeneration of jack pine. This trend is consistent with SFM modeling which shows an increase in the jack pine conifer (PjC) forest unit through time.*”

Table AR-14 includes a summary of the FTG results from the 2000-2005 term. This table includes insightful information on regeneration and silviculture success by forest unit and SGR number (actually silviculture treatment packages). This information could be used, as required, in a discussion of silviculture effectiveness; unfortunately, this did not occur.

**Recommendation 24: Norampac Inc. must include a thorough discussion of silviculture effectiveness in the next required Annual Report.**

The *Review of Modeling Assumptions* outlined some of the analysis that was done to draw the conclusions discussed in this section. Many of the recommendations were incorporated into the analysis used in the current FMP.

One of the requirements of the Year-Ten Annual Report is to discuss the achievement of objectives from the FMP. The discussion includes issues around drawing conclusions based on a five-year window, particularly for forest diversity and cover. The text provides good discussion based on the objectives in the plan and makes suggestions for consideration in setting objectives and targets for future plans.

The audit team also considered the degree to which the conclusions and recommendations of the 1995-2000 RPFO were considered in the production of the current FMP. There is evidence that many of the issues such as remote tourism, roads in caribou areas and Whitesand First Nation concerns over tending activities were included in the 2000-2005 FMP and the current FMP. The low level of reporting of natural regeneration was another area where improvement was evident through the Year-Ten Annual Report and continues to be a focus in the current FMP. Items that were identified for potential inclusion in the current plan that were still valid have been incorporated into objectives or strategies as appropriate.

The Year-Ten Annual Report is also required to evaluate the changes to the socio-economic profile and determine if the implementation of the plan influenced these changes. Given the broad scope of this analysis it is difficult if not impossible to determine what role the Armstrong Forest played in the community and regional level changes identified. The discussion in the Year-Ten Annual Report on the specific socio-economic objectives found in the FMP is far more meaningful and well done.

A summary of recommendations for consideration in the development of the next FMP has been included as the final section of the Year-Ten Annual Report. In future Year-Ten Annual Reports, recommendations and suggestions should be included as part of the text in the main body of the report. This would permit the reader to understand the context leading up to each suggestion or recommendation.

### **3.7 Achievement of Management Objectives and Forest Sustainability**

#### **3.7.1 Achievement of Management Objectives**

##### **Verification of 1995-2000 FMP Objectives Achievement from RPFO**

The audit team reviewed the assessment of the 1995-2005 FMP objective achievement made by the 2005 plan author in the RPFO. The RPFO provides important context for the 2005 FMP planning team. The audit team concurs with the plan author's assessment that the objectives were met with one exception as noted by the plan author. Wood supply commitments to Longlac Wood Industries (LWI) fell short due to uneconomical haul distances. The audit team noted that many of the objective statements are qualitative rather than quantitative. Progress is being made in successive plans at providing quantitative objectives to better measure the levels of achievement in each successive planning term.

##### **2000-2005 FMP Objectives**

A list of the objectives and audit team assessment of the achievement of each objective for the 2000-2005 term is provided in Table 6.

Table 6. Summary of the status of the 2000-2005 Armstrong Forest FMP management objectives (see FMP for full version).

<b>Objective/Target</b>	<b>Achieved: Yes/No/ Partial</b>	<b>Comments</b>	<b>Recommendation/ Suggestion</b>
<b>Forest Diversity</b>			
To maintain forest diversity within the bounds of natural variation.	Yes	This objective takes a long time for trends to become evident. There was a slight movement away from the disturbance template due to the "snowdown" that occurred in 2001 and the resulting salvage operations. Changes in forest units are generally a result of changing definitions rather than as a result of forest operations.	Recommendation 10

Continues on next page.

Table 6 continued.

Objective/Target	Achieved: Yes/No/ Partial	Comments	Recommendation/ Suggestion
To protect and/or enhance landscape processes which affect the structure, composition and function of forest ecosystems through minimizing adverse effects on terrestrial and aquatic ecosystems.	Partial	Adherence to the Forest Management Guidelines and proposed harvest/renewal schedule as observed in the field was satisfactory. Forest operation inspections as reported through FOIP and seen on a sample of field sites are accurate, reflecting protection of landscape processes but needs continued attention on compliance. Stream crossings, utilization and tree retention portions of the NDPEG requires improvement. MNR should continue the development and review of research and models supporting assessment of landscape processes	Suggestion 18 and Suggestion 19  Recommendation 15 and Recommendation 20  Recommendation 15  Suggestion 5 and Recommendation 11
<b>Provision of Forest Cover</b>			
To protect and maintain heron rookeries and nesting sites for bald/golden eagle and osprey.	Yes	There are no known heron rookeries and eagle/osprey nesting values affected by forest management activities. Nests were identified and managed according to the respective AOC prescriptions.	
To ensure a suitable and sustainable landscape containing adequate year-round caribou habitat north of the caribou line.	Yes	This objective was met by considering and incorporating direction provided in the <u>Forest Management Guidelines for the Conservation of Woodland Caribou: A Landscape Approach</u> . This included collection of caribou values information, stratification of the Forest into Habitat Management Zones and conducting a habitat supply analysis. As well, important known caribou habitats were protected during the five-year term of this FMP.	Best Practice 1
To maintain in suitable conditions, forest which has the capability to produce marten habitat.	Partial	Could only achieve 7.0% suitable marten habitat in core areas due to current extent and geographic distribution of suitable habitat on the forest. Projected to increase gradually to 8.0% in 2005 (achieved in 2005 FMP) and 16% in 2010.  Field observations indicated difficulties in retaining the required 6 dead or declining trees per ha and, where possible, the 2 trees larger than 30 cm in diameter per ha.	Recommendation 15

Continues on next page.

Table 6 continued.

Objective/Target	Achieved: Yes/No/ Partial	Comments	Recommendation/ Suggestion
To ensure the quality of moose habitat is maintained or enhanced.	Yes	Forest Management Guidelines for the Provision of Moose Habitat were implemented appropriately in the Moose Management Zone and the Moose-Caribou Integration Zone. Moose habitat related values were identified and AOCs to protect the values properly placed and adhered to during the audit period.	Recommendation 8 and Recommendation 9
To ensure the protection and maintenance of water quality and habitat for fisheries resources within watersheds where forest management activities occur.	Yes	The Timber Management Guidelines for the protection of Fish Habitat <sup>24</sup> were utilized through creating AOCs to protect fish habitat and water related values. Fisheries values that are unknown are assigned AOC values similar to cold water AOCs and therefore afforded protection consistent with the precautionary principle.	Suggestion 5, Suggestion 18 and Suggestion 19
<b>Socio and Economic Matters</b>			
To ensure that the Forest is managed in an environmentally sound manner to provide a sustainable, economical and predictable supply of quality wood fibre to user mills sourcing fibre from the Forest.	Partial	Not all the mills received the wood supply commitments as per Appendix E of the SFL.	Suggestion 16, Suggestion 23, Recommendation 25 and Recommendation 26
To identify and implement ways of achieving a more equal participation by local Native communities in the benefits provided through forest management planning and activities on the Forest and to maintain and protect Native cultural heritage values.	Yes	Direct employment opportunities in forest harvest activities were provided by Whitesand Forestry and BFPL-Armstrong Division. About 210,000 m <sup>3</sup> of wood was harvested through Whitesand Forestry overlapping license and an additional 200,000 m <sup>3</sup> was harvested through sub-contract to BFPL. Over 4,000 ha was site prepared by Whitesand First Nation and a number of renewal and tending opportunities were realized.	
	Partial	A small amount of tending and tree planting in 2004 and 2005 was conducted by a member of the Namaygoosisagagun community and additional work opportunities have been requested.	Suggestion 25
	Yes	Formal agreements have been reached with both Aboriginal communities.	Best Practice 2

Continues on next page.

<sup>24</sup> MNR. 1988. Timber Management Guidelines for the Protection of Fish Habitat. Queen's Printer for Ontario. 14 pp.

Table 6 continued.

Objective/Target	Achieved: Yes/No/ Partial	Comments	Recommendation/ Suggestion
	Yes	Namaygoosisagagun and Whitesand First Nation were consulted annually; two new values were identified and protected with AOC prescriptions and included in the Report of Protection of Identified Native Values during this period.	Best Practice 2 and Recommendation 5
To maintain and protect non-Native archaeological sites, cultural landscapes and traditional use sites.	Yes	No known cultural heritage sites were located or encountered during the 2000-2005 period.	
Encouraging opportunities for local employment in a range of forest management related activities, as well as in the service and supply sectors which support these activities, on the Forest.	Yes	Neenah Paper Inc. in Terrace Bay, Norampac in Red Rock and Bowater Canada Inc. in Thunder Bay all reduced output by one machine. Regional employment rates in Nipigon have dropped by about 5% and forestry sector employment as a percentage of the workforce has seen a reduction of 60% in Nipigon. Local residents throughout the Forest benefited from direct employment opportunities and owner-operator agreements in harvesting. The majority of silvicultural work was completed by local silvicultural entrepreneurs.	Recommendation 12
	Yes	The DM issued two overlapping licensees in support of this objective. These licensees had many operational problems that resulted in wasteful practices and damage to the environment.	Best Practice 2 Recommendation 15
Providing opportunities for remote commercial tourism and remote Crown land recreation on the Forest by ensuring that forest management activities are planned and implemented in a manner in which all of these uses can be sustained.	Yes	A variety of means was used to maintain contact with remote tourism operators: mail outs, planning team meetings, LCC meetings and direct communication with individual operators as well as members of the Armstrong Wilderness Outfitters Association.	Suggestion 3
Providing opportunities for road-based commercial tourism and road-based Crown land recreation on the Forest by ensuring that forest management activities are planned and implemented in a manner in which all of these uses can be sustained.	Yes	The location of summer operating areas was made known ahead of time and a contact person designated so that the road based tourism operators could plan and avoid those areas where harvest related traffic and noise was expected.	Suggestion 3

Continues on next page.

Table 6 continued.

Objective/Target	Achieved: Yes/No/ Partial	Comments	Recommendation/ Suggestion
Providing opportunities for other commercial Crown land users (i.e., trapping, mineral exploration, baitfishing etc.) by ensuring that forest management activities are planned and implemented in a manner in which all of these uses can be sustained.	Yes	Implementation of the appropriate guidelines and specific AOCs were done to ensure the impact on other uses was minimized. Discussions with LCC members revealed good liaison occurred with MNR and Company.	Suggestion 1
To provide volumes of timber for such uses as fuelwood, building logs and other local or personal uses through a range of mechanisms.	Yes	A total of 124 m <sup>3</sup> of fuelwood and 48 m <sup>3</sup> of personal use timber were utilized.	Suggestion 16
To ensure meaningful consultation, through open meetings with local communities, on issues which affect the social and economic health of that community.	Yes	AWS maps were posted at the Armstrong Resources Development Corporation office in Armstrong. Presentations with the LCC, overlapping licensees and residents on issues such as the road-link amendment, AWSs, etc. maintained a continual communication loop.	Recommendation 2, Recommendation 3, Recommendation 5, Recommendation 6, and Recommendation 12
<b>Silviculture</b>			
To optimize forest renewal and tending and maintain/enhance the long-term productivity of the forest in an environmentally sound manner, by combining current silvicultural knowledge, information and technology.	Yes	Renewal is in balance with harvest with a reasonable "lag-time" difference of area equal to the average of five years of harvest, (approximately 14,000 ha) which is what can be expected on a boreal forest SFL.	Suggestion 7, Suggestion 8, Suggestion 15, Suggestion 17, Suggestion 20 and Suggestion 21 Recommendation 13, Recommendation 17, Recommendation 18, Recommendation 19, Recommendation 20, Recommendation 22 and Recommendation 24

### 2005-2010 FMP Objectives

Since only the first year of the 2005-2010 period was within the audit period, the comments column in Table 7 are general observations based on past trends, sites and activities viewed in the field for the 2005-2006 year, and the planning documentation provided to the audit team. Where a specific finding is applicable to the current objective it is listed.

Table 7. Summary of the status of the 2005-2010 Armstrong Forest FMP management objectives (see FMP for full version).

Objective/Target	Achieved: Yes/No/ Partial/In Progress	Comments	Recommendation/ Suggestion
<b>Forest Diversity</b>			
To move the current frequency distribution and arrangement of disturbance perimeters toward a more natural distribution and arrangement. (A disturbance perimeter is defined as the gross areas created by harvest and fire – with <200m separation distance and <20-years old and <3 m in height and <0.3 stocking.)	In Progress	As there is no information yet available for the first year of this plan it is not possible to assess progress. Harvest areas are consistent with those forecast in the FMP, therefore it is reasonable to assume that targets will be met.	
To maintain a "natural" distribution of forest unit groups (forest unit groups will be defined as lowland, hardwood, spruce, pine).	Yes	The selected management alternative forecasts all forest unit groups to be within +/- 20% of the Null scenario throughout the plan horizon.	
To maintain a "natural" distribution of old age classes within each of the forest unit groups. (Forest unit groups will be defined as lowland, hardwood, spruce, pine, balsam fir.)	Yes	The selected management alternative forecasts forest unit groups to be above the -20% Null scenario for most terms. The achievement of this target is forecasted to be greater for the SMA than the other management alternatives.	
To reduce the balsam fir (BfM) forest unit area to more "natural" levels (level expected in a fire origin system).	Yes	Balsam fir is a minor component of the forest. Renewal practices will reduce fir.	
To provide natural stand structure attributes.	Partial	Tree retention standards in NDPEG requires improvement.	Recommendation 15
To minimize the effects on terrestrial and aquatic ecosystems by protecting landscape processes which affect the structure, composition and function of these ecosystems.	Partial	MNR should continue the development and review of research and models supporting assessment of landscape processes. Stream crossing installations need continuing monitoring.	Suggestion 16 and Suggestion 19

Continues on next page.

Table 7 continued.

Objective/Target	Achieved: Yes/No/ Partial/In Progress	Comments	Recommendation/ Suggestion
<b>Provision of Forest Cover</b>			
To ensure a suitable and sustainable landscape containing adequate year-round caribou habitat.	Yes	The caribou mosaic was developed within a complimentary framework of providing for both the habitat needs of woodland caribou and the forest management needs of Norampac. As a result, block size, configuration, timing, adjacency, etc. were all developed to provide for the sustainability of caribou habitat. Ontario Forest Analyst GIS-based tool was used to classify the habitat into capable forest and wetlands, suitable winter habitat, suitable refuge habitat and age class.	Best Practice 1
To maintain in suitable conditions, forest which has the capability to produce marten.	Yes	Armstrong Forest could not meet the 10% defined core area. Included parks which increased core area values. Achieved 9.4% in 2005 with forecasted increases thereafter.	
To provide for moose late winter habitat supply across "Moose" and "MZ" sub-units of the Forest. (Winter habitat will also be provided on other sub-units of the Forest, but will not actively be planned for.)	Yes	Moose late winter habitat provided in both zones.	Recommendation 9
To ensure the protection and maintenance of water quality and habitat for fisheries, and related (associated) terrestrial habitat, within watersheds where forest management activities occur.	Yes	Done through the implementation of AOCs as described in Table FMP-17 and AOC Supplementary Documentation.	Suggestion 16, Suggestion 18 and Suggestion 19
To conduct forestry operations in a manner that avoids impacts upon provincial parks and conservation reserves, and follows direction for Enhanced Management Areas on the Forest.	Yes	The FMP harvest schedule is being followed. This harvest schedule consists of allocated stands selected and was designed to meet this objective.	Suggestion 16 and Recommendation 20

Continues on next page.

Table 7 continued.

Objective/Target	Achieved: Yes/No/ Partial/In Progress	Comments	Recommendation/ Suggestion
<b>Socio and Economic Matters</b>			
To ensure that the Forest is managed in an environmentally sound manner to provide a sustainable, year-round, economical, and predictable supply of quality wood fibre to user mills sourcing fibre from the Forest.	In Progress	The Annual Report for 2005-2006 was not available at the time of the audit (not due until November 15, 2006) therefore it was not possible to review any harvest data. However, interviews and site visits indicated wood harvested was going to allocated mills except for the Longlac Wood Industries Appendix E commitment.	Recommendation 25 and Recommendation 26  Suggestion 23
To achieve participation by local Native communities in the benefits provided through forest management planning and activities.	In Progress	Whitesand First Nation is very active on the Forest and Namaygoosisagagun is still seeking more opportunities.	Suggestion 25 and Best Practice 2
To maintain and protect traditional/archaeological sites, and cultural landscapes use sites (Native and Non-Native).	Not Applicable	No sites identified in 2005-2006.	
To provide socio-economic benefits by encouraging opportunities for local employment in a range of forest management related activities and operations (harvest, renewal, maintenance, log hauling, road construction etc.), as well as in the service and supply sectors which support these activities, on the Forest (local means a permanent resident).	In Progress	Harvesting and silvicultural contractors were derived from Armstrong as much as possible.	
To ensure that forest management activities are planned and implemented in a manner that protects identified remote tourism values.	Yes	The RSA process was initiated but no formal RSAs were developed with remote tourism businesses. Norampac negotiated individual AOC prescriptions for lakes proximate to proposed forestry operations. Two issue resolution processes required with Regional Director making decision. Inspected implemented AOC prescriptions in the field.	

Continues on next page.

Table 7 continued.

Objective/Target	Achieved: Yes/No/ Partial/In Progress	Comments	Recommendation/ Suggestion
To ensure that forest management activities are planned and implemented in a manner that protects identified road-based tourism values.	Yes	Individual AOC protection provided to lakes where road-based tourism values exist; AOC for aesthetic reserve along Highway 527; road strategy to strike a balance between restricted use and no restrictions on use.	
To ensure that forest management Activities are planned and implemented in a manner in which Crown land recreation and other commercial Crown land uses (i.e., trapping, mineral exploration, baitfishing etc.) can be sustained.	Yes	Plan includes no timber harvest in riparian AOCs in response to trappers' concerns; AOC protection for identified trappers' cabins; seasonal operations restrictions along canoe routes; AOC protection for cottage sites aesthetics; AOC for aesthetic reserve along Highway 527.	
<b>Silviculture</b>			
To optimize forest renewal and tending and maintain/enhance the long-term productivity of the forest in an environmentally sound manner.	Yes	The balsam fir forest unit is moving to a more "natural" level. The overall level of renewal is in balance with the harvest area.	Suggestion 20, Suggestion 21, Suggestion 26 and Recommendation 22

### 3.7.2 Review of RPFO/Year-Ten Annual Report Assessment of Sustainability

The audit team also examined the 2004-2005 Year-Ten Annual Report. Both the Year-Ten AR and the 1995-2000 RPFO summarized the actual operations that were carried out during the 1995-2000 FMP period. The 1995-2000 RPFO contained an Assessment of Forest Sustainability written in accordance with the requirements of the FMPM that applied at the time of the plan production (Phase-in requirements from Appendix VIII of the 1996 FMPM) and the Year-Ten Annual Report for 2004-2005 included a Determination of Sustainability as required by the 2004 FMPM. Since the Year-Ten Annual Report review of sustainability contains the same information on sustainability as the Trend Analysis Report, the reader is referred to the review of the Trend Analysis Report. Some audit team observations on the Year-Ten Annual Report are listed below.

The Year-Ten Annual Report must:

- discuss the collective achievement of management objectives, and provide rationale for any management objectives for which desirable levels are not achieved; and
- provide a conclusion as to whether the implementation of planned operations has provided for the sustainability of the Crown forest.

The selected measurable indicators of forest sustainability presented in RPFO-18 included all the required elements (i.e. total productive Crown forest area, percent of available harvest area utilized, ratio of riparian reserve to length of shoreline adjacent to timber harvest activity, percent of Native communities in or adjacent to the forest which utilized the FMNCP, percent of silvicultural budget requirement actually received, value added and the LCC self-evaluation of its effectiveness). As reflected in the ARs, the percent of the AHA utilized is higher than originally planned due to the fact that a considerable portion of the 2000-2005 harvest area was classified as salvage and additional area was salvaged through

amendment planning. The audit team agrees with the Year-Ten Annual Report conclusion that in spite of the limited assessment permitted by only one term of data, satisfactory progress has been made toward the desired levels of indicators.

The Year-Ten Annual Report contains a thorough comparison of change in forest condition from the start of the 2000 FMP to the current period and against the desired future forest condition (for both the 2000 and 2005 FMPs). In addition, required annual report and RPFO tables were completed.

As expected, forest unit changes and other factors limited the discussion for some criteria, particularly the discussion of forest unit change through time and progression towards the desired future forest condition - *"after five years of FMP implementation, the forest unit composition of the Forest has seen minimal change (see table of forest unit distribution below). In addition, the roll-up of forest units and the different methods of dealing with young stands in forest modeling have made the trends less clear...overall, Table RPFO-13 shows some progress towards the desired future forest condition"*. Also, on page 68 of the report: *"Since Table RPFO-14 is intended to be built over successive FMP terms, with only one term being reported, there is little data to compare or assess. Forecast reductions in the available land base are primarily the result of planned reductions to the conversion to roads and landings"*.

Section 4.6.2 in the Year-Ten Annual Report has a comprehensive list of recommendations that should be considered in future FMPs. One recommendation that is missing is the stabilization of forest unit definitions so that trends can be adequately tracked. The audit team has made a caution under the subheading Forest Units in Section 3.7.3 that follows below.

The Year-Ten Annual Report also states that considerable progress has been made toward the achievement of all management objectives. This is a statement with which the audit team concurs. The reader is referred to Section 3.7.1 which provides a detailed analysis of the achievement of management objectives for the 2000-2005 FMP.

The Trend Analysis Report as well as the Year-Ten Annual Report concludes that implementation of the 2000-2005 operations, provided for the sustainability of the Armstrong Forest. The audit team also agrees with this statement.

### **3.7.3 Review of the Armstrong Forest Comparison and Trend Analysis of Planned versus Actual Forest Operations**

The Comparison and Trend Analysis of Planned vs. Actual Forest Operations Report (Trend Analysis Report) was submitted in time and met the requirements of the IFAPP. Some minor corrections were required to ensure the data matched the source documents and the revisions were completed satisfactorily.

#### Land Base

The total production forest and forested land base showed a small decrease from the 1990-1995 period to the 1995-2000 period and minor shifts in the main working groups and barren and scattered areas resulting from natural disturbance, regeneration programs and areas being declared free-to-grow. Two significant changes are noted. First, during the 1995-2000 term the Armstrong Forest production forest area was reduced by approximately 41% due to the expansion of Wabakimi Provincial Park and the creation of the Lake Nipigon Conservation Reserve, Ogoki Lake Conservation Reserve and Whitesand Provincial Park. These land base changes resulted in a reduction of nearly 200,000 ha. The Trend Analysis Report noted that the land base withdrawals occurred across all age classes. As well, a new digital inventory and the use of its Geographical Information System allowed the company to account for depletion and accruals on the Forest since 1991 in a more accurate manner. Further updates and changes resulted in a small increase in the total production forest at the beginning of the 2005 period primarily due to the inclusion of the caribou calving reserves.

The second most noteworthy change was documented in the 2005-2010 FMP where 73,309 ha were classified as "depleted". It appears that the planning team in consultation with the regional MNR planning specialists recognized that the 2000-2005 data should have included the "depletion" category and made the correction for the 2005-2010 term appropriately.

The auditors noted that, as stated in the Trend Analysis Report, "*it is very difficult to comment with any certainty on subtle changes in forest structure trends considering the land base withdrawals that have taken place and the incorporation of the new FRI. The most striking changes are the consecutively lower proportions that have occurred in the 41-60 years age class as the forest has aged.*"

#### Forest Units

Similar to other forests across the province, as the knowledge base and standards for working groups and forest units have evolved over the past 20 years, so has the classification of the Armstrong Forest descriptors. Interestingly, from 1990 when five basic forest units were used to describe the Forest, the number increased to 18 forest units for the 1995-2000 term, 16 forest units during the 2000-2005 term and simplified back down to nine forest units for the development of the 2005-2010 FMP. These nine forest units adequately reflect the range of forest stands for management purposes as seen by the audit team. To maximize future trend analyses, the audit team cautions Norampac to maintain the current forest unit descriptions unless significant changes in forest condition occur.

#### Harvest Activities

The actual harvest area is a little better than two-thirds of planned levels for the audit term (Table 8). There are no declared surpluses in the FMPs under review. A review of 33 Trend Analysis Reports published over the last decade in various IFA reports shows this level of achievement is the norm.

The achievement of actual harvest volumes relative to planned are higher than the achievement of actual harvest area versus planned except for the 2000-2005 period. The difference in the latter period was primarily due to the change of focus towards harvesting salvage areas with associated lower yields. Overall, 74% of the planned volumes were harvested versus 66% of the planned areas for the 15-year period. The rational given in the Trend Analysis Report is reasonable with 73,500 m<sup>3</sup> of additional volume realized from the unplanned salvage harvest efforts in the 1995-2000 term. It was noted that adjustments by the planning team were made reflecting the practice of adaptive management as experience and knowledge increased on the Forest (e.g., the pattern of overly high level of volume achievement compared to the planned versus actual harvest area in the 1995-2000 term resulted in the planning team adjusting the yield curves upward for the next plan).

#### Renewal Activities

Table 8 shows that actual regeneration activities have moved closer to planned (from 22% to 98%) over the past 15 years with an overall average of 54% achievement of actual versus planned. Natural regeneration was not reported in the 1990-1995 period and is reported in both the latter periods hence the increase is a change in reporting rather than on-the-ground performance. The more recent periods provide a better assessment of forest renewal compared to the earlier periods.

It must be recognized that there is always a time lag between when an area is harvested and when regeneration is reported to allow for the completion of mapping and artificial regeneration activities (Figure 24). The audit team notes that of the 54,145 ha harvested in the 15-year period, an equivalent area of 40,077 ha have been regenerated. The difference of 14,068 ha represents approximately a 25% difference of the total harvest which is a reasonable amount of "lag-time" area similar to other forests in the boreal forest. In fact it is reasonably close to the average five-year harvest area of 10,829 ha.

Table 8. Planned versus actual forest management activities for the last three planning periods on the Armstrong Forest.\*

		Plan Term			Total
		1990-1995	1995-2000	2000-2005	
Harvest Area (ha for 5 yrs)	Planned	25,850	33,495	23,165	82,510
	Actual	9,455	26,370	18,320	54,145
	Percent	37%	79%	79%	66%
Harvest Volume (m <sup>3</sup> /yr)	Planned	549,710	609,598	616,348	1,775,656
	Actual	263,145	637,987	411,298	1,311,351
	Percent	48%	105%	67%	74%
Regeneration Area (ha for 5 yrs)	Planned	21,141	30,752	22,551	74,444
	Actual	4,639	13,249	22,189	40,077
	Percent	22%	43%	98%	54%
Tending Area (ha for 5 yrs)	Planned	6,856	5,050	12,870	24,776
	Actual	1,783	2,894	5,852	10,364
	Percent	26%	57%	45%	42%
Free To Grow Area (ha for 5 yrs)	Planned	10,000	7,219	16,949	34,168
	Actual	8,577	17,311	11,588	37,476
	Percent	86%	240%	68%	110%
Of area surveyed, area in FTG		3,049	11,339	7,931	22,319
FTG as percent of Area Surveyed		36%	66%	68%	60%

\* The 2005-2006 harvest data is based on an average of the previous four years and the FTG actual data is based on six years of surveys, including 2006.

Sources: Trend Analysis Report (see Appendix A of this report) and RPFOs.



Figure 24. Free growing spruce over 20 years old.

During the 2000-2005 FMP term, overall tending achieved only 42% of planned activities. A number of reasons for the low level of achievement are given in the Trend Analysis Report including late start-ups, the configuration of areas and deferrals due to temporary camp locations within or adjacent to proposed areas. The Trend Analysis Report also indicated the concerns regarding the aerial application of herbicides by Whitesand First Nation which resulted in a reduction of the planned activities. The auditors noted that Norampac has held meetings and educational sessions to promote an understanding of the impact of herbicide use as a forest management tool. Also 910 ha were manually tended using local contractors some of which were First Nation based employing Aboriginal people.

#### Free-to-Grow Assessments

Table 7 in the Trend Analysis Report is meant to show the area successfully regenerated relative to the area harvested in the 1990-1995 term. As stated, the Company has attempted to accurately reflect what regeneration success has occurred in the areas harvested during the 1990-1995 term by bringing in additional FTG data acquired in 2005 and compiled in 2006. The audit team believes that the data given in Table 7 is satisfactory and provides a true picture of the renewal for the 1990-1995 FMP term.

Based on audit field observations and interviews, the overall 15-year average provides a more complete reflection of the status of renewal success on the forest. Therefore, rather than reviewing just the five-year period, the entire 16 years of FTG data is discussed below.

Norampac has achieved the highest percent of actual to plan in the FTG assessments category by completing 110% of the planned surveys over the 16 years. Of the 34,168 ha planned, 37,476 ha were assessed over the 16-year period, resulting in a 110% achievement level. Of the 37,476 ha surveyed 22,319 ha did meet the FTG standards, a 60% level of success. Please note that the 60% level of success remains the same whether 15 years or 16 years of FTG data is used as calculated by the audit team. The average 60% level of renewal success over the past 16 years reflects what the audit team observed in the field. The percentage of area declared FTG has increased over the past 16 years. This reflects the appropriate linking of assessment timing to the specific renewal treatment (i.e. the status to assess for FTG on areas naturally regenerated can take as long as 11 years).

#### **3.7.4 Achievement of Forest Sustainability**

Prior to the implementation of the CFSAs, the objective of forest management was to provide timber to the forest industry in a manner consistent with sound environmental practices and to provide for other uses of the forest. With implementation of the CFSAs on April 1, 1995, recognition was given to the importance of forest sustainability. It should be kept in mind that the means of achieving forest sustainability under the CFSAs is through the management of forest cover. According to the CFSAs, forest sustainability is defined as long-term Crown forest health. The sustainability of a Crown forest shall be determined in accordance with the FMPM. The FMPM shall provide for determinations of the sustainability of Crown forests in a manner consistent with the following principles:

- Large, healthy, diverse and productive Crown forests and their associated ecological processes and biological diversity should be conserved.
- The long-term health and vigour of Crown forests should be provided for by using forest practices that, within the limits of silvicultural requirements, emulate natural disturbances and landscape patterns while minimizing adverse effects on plant life, animal life, water, soil, air and social and economic values, including recreational values and heritage values.

The methods of planning for and assessing the achievement of forest sustainability are described in the FMPM. It begins with an eight-step process that includes gathering background information, setting objectives and developing strategies, identification and analysis of management alternatives, selection of a preferred management alternative, and the identification of specific areas for forest operations. Throughout the process opportunities are available to the public to participate and provide input into the development of the FMP. The assessment of achievement of forest sustainability involves the analysis of trends associated with a set of criteria and indicators of sustainability, given in the FMPM. The FMP

Planning Team and Armstrong Forest LCC chose a management alternative which best met the target ranges of indicators and objectives. The indicators utilized in the 2000-2005 FMP include forest diversity indices, managed Crown forest area available for timber production, preferred habitat for selected wildlife, the percent of available harvest area which is actually utilized, the frequency distribution of clearcut and wildfire sizes, landscape pattern indices, composition by age, old growth and the current landscape pattern. The above listed indicators all contribute to meeting the six forest sustainability criteria listed in Table 9.

Table 9. Summary of assessment of forest sustainability.

Forest Sustainability Criteria	Met (Yes/No/Partial)	Audit Team Comments
Conservation of Biological Diversity	Yes	Forest unit composition of the Forest saw little change over the audit term. Age class diversity is increasing.
Maintenance and Enhancement of Forest Ecosystem Condition and Productivity	Yes	Effect of blowdown/"snowdown" damage will be long term as younger age-classes were also impacted but these are natural processes. The productive forest landbase remains intact; withdrawals for parks provide ecological services.
Conservation of Soil and Water Resources	Yes	Industry conducted 523 compliance inspections to ensure forest management activities and their effects on soil and water were minimized.
Forest Ecosystem Contributions to Global Ecological Cycles	Yes	Forest regeneration was balanced with harvest.
Multiple Benefits to Society	Partial	Not all the wood supply commitments were met during the audit term. A decrease in the level of harvest is forecast over the next 30 years. Impact of remote tourism on local community of Armstrong is very limited. Economic benefits from forest management activities are accruing to Whitesand First Nation.
Accepting Society's Responsibility for Sustainable Development	Yes	A three-tiered management system was included to address caribou and moose habitat needs in relation to specific ecological characteristics on the Forest. Marten core areas were under achieved in the 2005-2010 FMP but are forecasted to increase. Considerable efforts by MNR, the Company and First Nations to meet concerns and issues. Both Whitesand First Nation and Namaygoosisagagun participated in Forest Management Native Consultation Program. While economic benefits have accrued to Whitesand First Nation, Namaygoosisagagun has derived very little economic benefit from the Forest. This is followed up with a suggestion in Section 3.8.

Based on a review of the 2005-2010 FMP, interviews with Norampac and MNR staff, interviews with the LCC, overlapping licensees and Aboriginal community representatives, public input, field observations and the review of the forest management planning documentation, progress is evident in all of the criteria. The audit team noted that the long-term health and vigour of the Forest is being provided for by using forest practices within the limits of silvicultural requirements as per the CFSAs.

The audit team did have a concern regarding the decline in actual average yields from the forest. From an average of 138.68 m<sup>3</sup>/ha in the 1990-1995 term, to 120.93 m<sup>3</sup>/ha in the 1995-2000 term to an average 112.25 m<sup>3</sup>/ha in the audit term represents a decrease of about 20%. In discussions with Norampac staff, the lower yields associated with the salvage harvest in the 2000-2005 term and more accurate recording of harvest data were the primary reasons given for the decrease. Associated with the decrease in yield is a similarly forecast decrease in available conifer and poplar volumes as illustrated in Table 10.

Table 10. Forecasted volume and area for the Armstrong Forest.

Term	Planned Volume (m <sup>3</sup> )	Planned Area (ha)	Planned Yield (m <sup>3</sup> /ha)	Actual Yield (m <sup>3</sup> /ha)
1990	549,710	5,170	106.0	139.0
1995	609,598	6,699	91.0	121.0
2000	616,348	4,641	133.0	112.0
2005	526,132	4,262	123.0	-
2025	430,628	3,229	133.0	-
2035	399,982	2,767	144.0	-
2055	403,391	2,927	138.0	-

The age-class gap accounts for the forecasted decrease in harvest levels over the next 30 years. The higher forecasted yields are a result of the better management of planting densities in the current 10-30 year age classes as compared to those originating from fire, but the effects on the allowable harvest level will not take place until 30 or more years from now (i.e. in 2055+).

The audit team believes the Forest is being managed in a sustainable manner but because the level of harvest is forecast to decrease over the next 30 years, the criterion, *Multiple Benefits to Society* can only be partially met. If the current age-class structure with its associated "age-class gap" is correct, a continuous even flow of product is not possible.

All the evidence would suggest that the long-term forest ecosystem health will be maintained. Hence, the forest is being managed sustainably based upon the CDSA definition. Given the satisfactory quality and rate of forest renewal, the forest management observed by the audit team meets qualitative measures of sustainability.

### 3.8 Contractual Obligations

#### Sustainable Forest Licence Requirements

The SFL number 54225 was transferred to Domtar in April 1997 and to Norampac in 2002. In May 2003, the SFL was amended to account for boundary changes due to land withdrawals originating from the Ontario Living Legacy initiative. The May 24, 2005 copy of the SFL was updated to account for changes in compliance planning and monitoring. The most current version of the SFL signed May 5, 2006 made changes to the Appendix E wood supply commitments, North American Datum 83 map and an extension of the SFL term.

Under the auspices of an FRL on the Armstrong Forest and a Memorandum of Agreement between Norampac and BFPL, harvest operations with BFPL supply Great West Timber Thunder Bay sawmills with sawlog material which in turn supplies the Red Rock mill with softwood chips, sawdust and shavings. Whitesand Forestry also holds an FRL to harvest conifer and hardwood from the Forest. The SFL also contains wood supply commitments in Appendix E. Wood directives are in existence as well between the various companies which obtain their wood from the Forest. The wood supply and flow from the Forest is underpinned by the FRL, MOA and a business arrangement Norampac has with BFPL.

The audit team received a significant amount of input and concerns from Overlapping License holders, Appendix E wood supply commitment holders and the auditees about the wood directives and flow, or lack thereof, on the Forest. An attempt was made to derive an accurate set of numbers on the actual wood flow and fibre exchange from the Forest for the audit period but it was not possible. The complexity in trying to balance the data between the MNR TREES<sup>25</sup> numbers and that provided by the companies (i.e. Longlac Wood Industries, Great West Timber, Northern Sawmills, Nakina Forest Products, Long Lake Forest Products, Northern Hardwoods, and the Norampac Red Rock mill) made it difficult. In addition to the above complexities, the wood deliveries included the following:

- regular harvest allocations
- regular harvest allocations with salvage rate (2001 "snowdown")
- 2001 "snowdown" salvage allocations (natural depletion)

However, some trends are evident and the following discussion summarizes the data and provides sufficient evidence about whether or not the Appendix E wood supply commitments were met.

As can be seen in Table 11 the wood supply commitments for both Longlac Wood Industries and Neenah Paper Inc. (Neenah Paper) were not met. Note that the most recent version of the SFL (May 5, 2006) has changed the wood supply commitments to both Longlac Wood Industries and Buchanan Northern Hardwoods. Therefore, Table 11 indicates only the trend throughout the audit period. Longlac Wood Industries' poplar veneer needs, although always present, are difficult to obtain economically from the Forest due to long road distance and/or higher rail costs. Northern Hardwoods received a significant amount of poplar.

Table 11. Appendix E wood supply commitments and level of achievement for the Armstrong Forest (2000-2005).\*

Mill	Five-year Commitment (m <sup>3</sup> )	Approximate Amount Delivered (m <sup>3</sup> )	Percent Achievement
Northern Hardwoods (poplar)	0	~413,636	N/A
Northern Hardwoods (white birch)	250,000	~24,415	10
Great West Timber/Northern Sawmills (conifer)	1,985,000	~1,263,202	64
Longlac Wood Industries (poplar veneer/flakes)	325,000	~10,278	3
Neenah Paper Inc. (poplar pulp)	325000	0	0

\* Numbers are an approximation of the level of achievement only.

A factor influencing the wood flow is the joint ownership of Norampac between Cascades and Domtar. Domtar obtains wood from the adjoining Lake Nipigon Forest for its White River sawmill. In their discussion and input with the audit team, Domtar has made it clear that it favours a shareholder type of SFL for both the Armstrong and Lake Nipigon Forests. Longlac Wood Industries staff also believes that a shareholder type of SFL will enable it to obtain its wood supply commitments in a more sustainable manner. However, Norampac have stated that their business-to-business agreement with BFPL makes a shareholder approach difficult. An interview with BFPL staff indicated that the existing fibre commitments can be met and that Longlac Wood Industries can have all the poplar from the Forest for its needs. The changes to Appendix E referenced above may reflect some of the changes needed.

<sup>25</sup> Timber REsources Evaluation Systems. An MNR database system to track harvest volumes reported by industry.

Based on the considerable input the audit team received on the issue of wood flow and allocations, the complexities of past and existing business agreements in place, the reality of economic wood flow, and the many changes occurring in the forest industry at this time, the audit team believes the entire Appendix E approach to wood supply commitments would benefit from a review. Changing the wood directives should be the first step since these are based on market and mill requirements which have changed considerably over the audit period. A report entitled Towards Resolving Utilization Issues-A Process to Manage Unutilized Fiber<sup>26</sup> exists which may provide some useful input into resolving the wood supply issue on both the Armstrong and Lake Nipigon Forests.

**Suggestion 23: The Ministry of Natural Resources and Norampac should incorporate the principles listed in the report Towards Resolving Utilization Issues-A Process to Manage Unutilized Fiber to resolve the wood supply commitments in Appendix E of the Sustainable Forest Licence.**

Through interviews and documentation it appears that the various mills that depend on the Armstrong Forest for their fibre needs did receive sufficient wood during the audit period. The wood flow may not have met the Appendix E commitments but the market-driven necessity of obtaining wood economically made it possible for the mills to meet their fibre needs during the audit period. Whether a shareholder type of arrangement is best suited for the Armstrong Forest, as opposed to the current arrangement or some other approach, remains outside the scope of the audit. The audit team noted that a considerable amount of time is spent by all parties on trying to meet the existing agreements and the Appendix E wood supply commitments that are not being fully met. The 2001 IFA had several recommendations directed to the Appendix E Wood Supply Commitments which were not met during the audit term. Therefore, the following recommendation is given.

**Recommendation 25: Corporate Ministry of Natural Resources must determine if the approach to wood supply commitments in Appendix E of the Sustainable Forest Licence needs to be replaced with a different process.**

Memoranda of Agreements are in place for Northern Hardwoods, Longlac Wood Industries and Great West Timber as stipulated in the SFL. An MOA between Norampac and Neenah Paper is not in place.

**Recommendation 26: Norampac Inc. and Neenah Paper Inc. must complete a Memorandum of Agreement as stipulated in Appendix E of the Sustainable Forest Licence.**

The audit team was asked to determine if the allowable harvest level in the FMP is sufficient to meet the Appendix E wood supply commitments. Although there is a difference of 185,000 m<sup>3</sup> over five years between the committed conifer volume and available conifer harvest volume (FMP-20), this is a result of Ontario's Living Legacy<sup>27</sup> land reductions and has been countered with an equivalent volume from the neighbouring Lake Nipigon Forest. The poplar allowable harvest volumes were sufficient to meet the Appendix E wood supply commitments, whereas the birch allowable harvest volumes were insufficient to meet the Appendix E wood supply commitments. The Appendix E birch commitment is an uncompleted recommendation from the previous audit (see Table 12).

### **Independent Forest Audit Action Plans and Status Reports**

The Company and MNR were required to submit an action plan responding to the 2001 IFA of the Armstrong Forest recommendations within two months of receiving the final audit report and to provide a status report on the implementation of the recommendations within two years following approval of the

<sup>26</sup> Industry/MNR Utilization Task Team. 1999. Towards Resolving Utilization Issues "A Process to Manage Unutilized Fiber. 12 pp. + Appendices.

<sup>27</sup> MNR. 1999. Ontario's Living Legacy Land Use Strategy. Queen's Printer for Ontario.

action plan. The final audit report was received on June 15, 2002. The IFA action plan was submitted on April 15, 2003 and approved May 26, 2003 making it eight months late. The IFA Action Status Report was submitted on November 28, 2005 which was six months late. The audit team recognizes that both the action plan and action plan status report were submitted late but notes that audit recommendations are increasing in number along with the number of audit procedures which often requires interaction, liaison and budgeting between MNR, the Company and/or Corporate MNR. Rather than directing a recommendation at the Company and MNR to adhere to action plan reporting dates, the audit team believes that a suggestion is warranted to accommodate the increasing complexity and requirements of many of the recommendations.

**Suggestion 24: Corporate Ministry of Natural Resources should consider lengthening the time to prepare an action plan report from two months to six months.**

As noted, the action plan status report was late by nearly one half year. The audit team believes a two-year time interval to prepare an Audit Action Plan Status Report is reasonable and lists the following recommendation.

**Recommendation 27: Norampac Inc. and the Ministry of Natural Resources must meet the Independent Forest Audit Status Report submission date.**

The public has been notified of the availability of IFA reports and associated action plans on the MNR website at <http://ontariosforests.mnr.gov.on.ca/audit.cfm>.

Of the 21 recommendations from the 2001 IFA, nine were directed to the MNR and ten to the Company and two recommendations were directed jointly to the MNR and Company. The action plan and action plan status report prepared by the Company and MNR were well done and met the requirements (i.e. the action and method of tracking progress, the organization and position responsible, the deadline date and the status were identified and recorded).

Some of the action items required resources outside the capacity and/or responsibility of the local Ministry and Company and are still ongoing. The changes to the hardwood commitments in Appendix E, for example, are under review and may be changed due to the pending decision by Longlac Wood Industries to proceed with a new Oriented Strand Board mill. Some action items associated with a recommendation were completed whereas other action items with the same recommendation are still ongoing. As per the requirements of the IFAPP (Appendix E), Forest Management Branch developed a summary of the action plan status report and identified the status of the recommendations. This was provided to the audit team in early April 2006. Table 12 provides the status of the recommendations as found by the audit team. The audit team has reviewed the Forest Management Branch summary and identified some action items that need to be completed and are addressed in Recommendation 28.

Table 12. Completion status of the 2001 Independent Forest Audit recommendations.

Recommendations from the 2001 Armstrong Forest IFA		Status	Completed Yes/No/ Ongoing
1	The Minister should renew the SFL of the Armstrong Forest.	Completed and signed in May 2006.	Yes
2	The LCC representative to the planning team should operate as an impartial liaison between the two.	The Armstrong LCC participated through an appointment of a representative (twice) and an alternate as well as utilizing an MNR survey to provide their input.	Yes

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Table 12 continued.

	Recommendations from the 2001 Armstrong Forest IFA	Status	Completed Yes/No/ Ongoing
3	The MNR should work with local aboriginal communities on improving the native consultation process to meet the unique needs on the Armstrong Forest.	Considerable work was done to improve consultation including Aboriginal community representatives participating in the planning team, both Aboriginal communities were involved in the FMNCP, additional consultation and documentation opportunities were utilized and the formal consultation requirements were modified based on input from Aboriginal community representatives. MNR hired a consultant to assist in updating the Native Background Information Reports and values maps but the report has not yet been submitted.	Yes  No
4	The MNR should work with, and provide additional resources to, the Whitesand First Nation and Namaygoosisagagun to improve the collection of native values information.	MNR provided the 2000-2005 NBIR and up-to-date NRVIS maps to both Aboriginal communities.  Funding for both non-timber and Aboriginal values provided but Native Background Information Report has not yet been received.	Yes  Ongoing
5	Land allocation for specific wildlife mosaic blocks or core areas should not be withdrawn or deferred in the calculation/determination of the available harvest area. Only lands where forest management operations are specifically excluded, through a land use planning decision or a specific reserve prescription, should be withdrawn from the available forest area.	The provincial <u>Marten Habitat Guide Interpretation Note</u> <sup>28</sup> was utilized during plan production.	Yes
6	The analysis of management alternatives processes and the tables supporting it should be revised to present information more clearly and make the analysis less arbitrary.	2004 FMPM now in place governs this activity.	Yes
7	The MNR should review its approach to socio-economic impact assessment and the use of the Socio-Economic Impact Model and the applicability of both to forest management planning.	New SEIM in place with flexibility to use an alternative MNR supported methodology.	Yes
8	Domtar should continue to work with the Whitesand Band [First Nation] to develop timelines for road rehabilitation, particularly in the Flat Lake area. Roads should normally be rehabilitated between 15 and 40 years after forest operations.	Criteria and a tally sheet have evolved in determining road rehabilitation and specific strategies put in place for the Flat Lake area. Criteria are still being refined.	Yes  Ongoing

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<sup>28</sup> MNR. 2004. Marten Habitat Guide Interpretation Note. 9 pp. + Appendices.

Table 12 continued.

	Recommendations from the 2001 Armstrong Forest IFA	Status	Completed Yes/No/ Ongoing
9	The MNR and Domtar should continue to monitor stand development in the Flat Lake area. If conifer-dominated stands are not adequately regenerating, MNR and Domtar should work with the Whitesand Band [First Nation] to develop acceptable silvicultural prescriptions.	Monitoring and consultation with Whitesand First Nation done on an annual basis.	Yes
10	The MNR should ensure that values were mapped accurately in the forest management plan and the annual work schedule.	FMP maps included values identified to date in the areas selected for operations. Problems remained with timelines and digital representation of digital information.	Ongoing No
11	Roadside slash piles are to be reduced or eliminated on the Armstrong Forest.	FOIR reports and the Slash Pile Burning Summary are complete. In 2001-2004 only a limited amount was completed. 2004-05 saw considerable improvement	No (2001-04) Yes (2004-05) Ongoing
12	Domtar should develop operation procedures to minimize site damage for harvesting on lowland black spruce sites.	Training completed at spring AWS meetings. A guide under development by FERIC. Very little site damage witnessed. Field site 5 was exception.	Yes Ongoing
13	All bridges on the Armstrong Forest are to have the proper approach signs and bridge corner flashings.	19 of 21 existing bridge locations completed. Two remaining.	Yes
14	Domtar and the MNR should agree on the responsibility for maintaining and, where required, upgrading older water crossings on the Armstrong Forest.	Responsibilities assigned as per Responsibility Determination Index and inventory in progress. A draft matrix put in place only in 2005.	Ongoing
15	Domtar should increase monitoring activities on crossings to ensure they meet all applicable laws and regulations.	Norampac has completed 44 informal water crossing inspections and two through FOIP. Water crossing training sessions implemented as needed. FOIRs have been done on proper grading techniques at water crossings. Audit team viewed good grading practices during site visits.	Yes Ongoing
16	Domtar should facilitate training for all operators on the Armstrong Forest to ensure that operations comply with all applicable laws, regulations, and standards.	All four actions in status report completed with training provided in specific areas (e.g. snag management, water crossing workshops, etc.). EMS program in place for staff and silviculture contractors – reviewed annually. BFPL has an EMS program specific for harvesting-related operations. Norampac has an “arms-length” approach to compliance monitoring of on-the-ground harvesting-related operations, with BFPL doing majority of it. Norampac regularly reviews the completed compliance reports on-line. Norampac can and does request employee training records from BFPL.	Yes Ongoing

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Table 12 continued.

Recommendations from the 2001 Armstrong Forest IFA		Status	Completed Yes/No/ Ongoing
17	Domtar should establish a program to monitor the condition of naturally regenerated sites prior to formal FTG surveys.	Lowland stocking assessments being done. Recommend looking at natural upland conifer sites also.	Yes
18	Annual reports should provide clearer explanations of deviations from planned performance levels.	Satisfactory as per status report Improved along with reporting requirements.	Yes
19	Domtar should take a more active and regular role in monitoring the payments into the Forest Renewal Trust account.	Completed to 2004-2005	Yes
20	The MNR should revise the white birch commitment from the Armstrong Forest to be consistent with the productive capacity of the forest.	The most recent version of the SFL has the reference to white birch removed.	Yes
21	Domtar should make available 100% of the available poplar, up to 130,000 cubic metres, to Longlac Wood Industries and/or Kimberly-Clark (now Neenah Paper).	Neenah Paper received only some of its poplar allocation during audit period.  The most recent version of the SFL has changed the Longlac Wood Industries commitment. Supply Agreements referenced in the SFL do not require execution until November 2006.	No  Ongoing

Based on the field visits, interviews and public input, the audit team believes the following action items for recommendations from the previous 2001 IFA were not completely addressed in a satisfactory manner and/or need continued attention to be finished.

**Recommendation 28: Norampac Inc. and the Ministry of Natural Resources must continue to complete the action items arising from the recommendations in the 2001 Independent Forest Audit as follows:**

- The Native Background Information Report for Whitesand First Nation must be completed (see Recommendation 5).
- Complete testing the criteria for identifying specific roads or sections of roads for rehabilitation in those areas identified as having potential future caribou habitat.
- The Appendix E wood supply commitment to Longlac Wood Industries and Neenah Paper Inc. was not fully met during the audit term (see Recommendation 26).
- Complete the responsibility matrix for maintenance of older water crossings.

#### Forest Renewal Trust Fund

The Company maintains records of all of the activities undertaken under the auspices of the Forest Renewal Trust Fund. The audit team reviewed the Specified Procedures Report and randomly selected and viewed a representative sample equaling 35% of the activities reported as carried out with funds from the Renewal Trust Fund for the April 1, 2004 to March 31, 2005 fiscal year. The mapped records accurately reflected the work done in the field.

A review of MNR statements indicated that there was a small nominal amount of Forestry Futures charges owing in the account as of March 31, 2006. Norampac is required to maintain a minimum balance in the Forest Renewal Trust account as specified in the SFL. A significant surplus existed in the trust account at the start of the 2001 which was reduced through decreases in the renewal funds until the surplus was reduced by approximately one half in 2005 and 2006. The minimum balance was maintained throughout the five-year period.

The SFL requires an analysis of the forest renewal charges to be carried out by the license holder no less frequently than every five years in conjunction with the term of the FMP. Norampac completes an analysis every year which records the past revenue derived from the harvest and actual renewal expenditures and forecasts the level of harvest and associated renewal activities several years ahead. This analysis has maintained a level of renewal trust funding sufficient to meet the renewal funding requirements and maintain the required minimum balance during the audit period.

### **Forest Compliance**

A review of approval dates for the five-year and annual compliance plans prepared by Norampac and the issuance dates of Cut Approvals and FRLs found that the compliance plans were approved by MNR before it issued any Cut Approvals or FRLs.

Section 21.5 of the SFL (May, 2005) states that "*The Company and those Overlapping Licensees referred to in paragraph 21.1 are responsible for establishing and delivering internal prevention/education programs and for providing individual staff training to competency standards approved by the Ministry of Natural Resources. The compliance plan must describe the internal prevention/education program responsibilities of the Company and applicable Overlapping Licensees.*"

Norampac outlined an internal compliance prevention and education program in the 2000-2005 Compliance Plan and the 2005-2010 Compliance Plan. It includes commitments to educate and train management staff and encourage Overlapping Licensees to train all personnel on proper operating procedures, relevant provincial regulations, policies and guidelines, to protect and maintain the health of the forest ecosystem and to promote public safety. A commitment was also made to improve communication between Norampac, MNR and overlapping licensees regarding compliance matters. Norampac also committed in the compliance plans to keep abreast of seminars and workshops which might be of advantage to overlapping licensees for compliance training purposes and will encourage attendance.

To meet these commitments, Norampac conducted annual work schedule meetings with each Overlapping Licensee and MNR to discuss site-specific operating prescriptions and review environmental, safety and legislative requirements and discuss compliance priorities. In addition to the AWS meetings held each spring, Norampac also holds meetings throughout the year as the need arises. Norampac also addressed compliance issues identified through inspections during previous operating terms by conducting training workshops (e.g. construction of water crossings) and the provision of additional information to overlapping licensees (e.g. information on CLAAG harvest practices, water crossings, snag tree requirements, procedures for unidentified streams) through hand-outs and posters at meetings.

Domtar, who manages the forest on behalf of Norampac, also has an EMS (ISO 14001) in place which is reviewed annually with staff and silviculture contractors. It provides a means of organizing environmental concerns through setting objectives and targets, as well as promoting continuous improvement. The EMS program also includes components applicable to compliance prevention and education. EMS booklets were distributed to all personnel and included emergency phone numbers, company policy commitments, health and safety responsibilities and reporting requirements, fire prevention and control, information on how to handle spills, and applicable standard operating procedures.

Buchanan Forest Products Ltd. (Overlapping Licensee) also has an EMS program in place which addresses environmental concerns of its operations on the Armstrong Forest. Norampac staff, Overlapping Licensees and contractors took advantage of workshops, training opportunities and operational meetings that were coordinated by Norampac.

Through the overlapping licence agreements, Overlapping Licensees are responsible for providing training to staff and contractors to ensure operations meet compliance requirements. The previous audit recommended that the SFL holder be more involved and facilitate training for all operators on the Forest to ensure that operations comply with all applicable laws, regulations, and standards. Based on the evidence above and in Section 3.5 of this report the audit team concludes that Norampac has fulfilled the recommendation.

### **Operations on Mining Claims**

Upon receipt of the AWS the MNR notified all recorded and patented claim holders located within proposed operating areas of Norampac's intent as required of the SFL. On file were copies of the letter used each year as well as the mailing list. Recorded and patented claim holders were instructed to address any concerns to the Company and those received were on file at the Norampac office including correspondence from the Company.

### **First Nations**

Norampac is required to work cooperatively with MNR and local Aboriginal communities in order to identify and implement ways of achieving a more equal participation by Aboriginal communities in the benefits provided through forest management planning. This requirement is contained in the SFL and supports Condition 34 of the Class EA Declaration Order.

During the 2000-2005 FMP term, a number of harvesting opportunities were provided to Whitesand First Nation including an overlapping license for softwood and hardwood. Whitesand Forestry harvested a total of 152,453 m<sup>3</sup> of conifer and 65,173 m<sup>3</sup> of hardwood. In addition, Whitesand Forestry also harvested 185,360 m<sup>3</sup> of conifer and 26,825 m<sup>3</sup> of hardwood from salvage harvest areas. The additional harvesting was done through sub-contract to BFPL. Whitesand First Nation members were also employed in site preparation, tree planting, ground tending and pre-commercial thinning.

A contractual arrangement between Whitesand Forestry and BFPL resulted in two training programs. One program allowed Whitesand Forestry mechanics to work side by side with BFPL mechanics in an effort to improve their knowledge of equipment maintenance. The second program, "harvest foreman trainee" allowed forestry employees to work along side a harvesting foreman.

Norampac has indicated that a number of harvesting opportunities were provided to Namaygoosisagagun members, but unfortunately none could take advantage of these opportunities. In addition, members were advised to go to the contractors directly to seek employment but there is no requirement for independent contractors to hire any Aboriginal community members.

An "Enhanced Ongoing Consultation Agreement" was signed with Namaygoosisagagun, MNR, Domtar (the SFL manager) and Norampac. As mentioned earlier in this report, Namaygoosisagagun did not feel the terms of the agreement were being adhered to by the other parties. With the exception of one tree planting contract in 2004 (145,146 trees were planted), the community felt that employment opportunities were not being provided. Opportunities such as tree planting on demonstration areas were to be provided on a first opportunity basis before being tendered for bids. Namaygoosisagagun representatives indicated they heard about tree planting contracts from Whitesand First Nation, but these were not on demonstration areas. A change in leadership at Namaygoosisagagun also may have contributed to misinterpretation. Since there appeared to be some misunderstanding of how these opportunities were to be directed, all parties involved need to reach an agreement of how these opportunities can be fulfilled. The audit team recognizes the endeavors made by the District Manager by

committing MNR to having this enhanced consultation process with Namaygoosisagagun, the audit team also understands the discontent of Namaygoosisagagun. In consideration of the fact that the agreement is fairly new, further dialogue between the parties may be necessary to reach mutual satisfaction in regards to the terms of reference and, in particular, how employment opportunities can be fulfilled.

**Suggestion 25: The Ministry of Natural Resources and Norampac Inc. should ensure Namaygoosisagagun is in mutual agreement with the terms of reference in the "Enhanced Ongoing Consultation Agreement" and how employment opportunities can be fulfilled.**

Although the audit team has made a suggestion for improving communication on employment opportunities, it was obvious that a considerable effort has been made by Norampac and MNR with both Whitesand First Nation and Namaygoosisagagun. A Memorandum of Agreement between Whitesand First Nation and MNR was signed in 2000 and an "Enhanced Ongoing Consultation Agreement" was signed with Namaygoosisagagun in 2004. In addition, Table 13 below provides an indication of the percentage of forest management activities employing Aboriginal community members. The adjoining Lake Nipigon Forest is included as Norampac is also the SFL holder on that forest and the data provides a basis for comparison.

Table 13. Participation of Aboriginal people in forest management activities on the Armstrong and Lake Nipigon Forests for the 2001-2006 term.

Category	Armstrong Forest %	Lake Nipigon Forest %
Total harvest by volume including salvage	19	27
Total number of trees planted	45	13
Pre-commercial thinning area	0	56
Ground tending area	49	0
Mechanical site preparation area	36	4

The audit team provides a best practice to Norampac, MNR, BFPL, Whitesand First Nation and Namaygoosisagagun to acknowledge the attempts and efforts made in providing employment opportunities to Aboriginal community members and encourages the continuation of these endeavours.

**Best Practice 2: Norampac Inc., Ministry of Natural Resources, Buchanan Forest Products Ltd., Whitesand First Nation and Namaygoosisagagun are commended for working together to provide increasing employment opportunities in forest management activities for Aboriginal community members.**

### Forest Information Manual

The Company met its contractual obligations as per FIM. The data management portions are handled with efficiency and professionalism. The MNR's obligations in providing data to the company have not been met. Ownership layers were not provided in a timely manner in the preparation of the planning inventory. The Company was able to deal with these problems in a satisfactory manner to avoid plan delays. Recommendation 8 in Section 3.3.5 addresses the need for MNR to ensure the information required by the FIM is provided.

### Silviculture

A sampling of all types of eligible silviculture work completed during the term was verified on maps and stand listings and was observed in the field. Treatments included mechanical site preparation, seeding, planting and tending. Natural renewal treatments were also viewed. There were no significant pest outbreaks during the 2001-2006 term, and thus Norampac did not participate in a pest control program.

However, extensive areas damaged by the 2001 “snowdown” event are now being attacked by bark beetles. The audit team urges MNR and Norampac to continue to monitor this outbreak, which may have the potential to significantly reduce the mature jack pine content on the Forest.

Silviculture activities were carried out as reported with funds from the Renewal Trust Account. Most treatments were effective with some exceptions as described in Section 3.4.3 of this report. As a result the audit team developed some recommendations and suggestions aimed at improving the renewal program on the Armstrong Forest.

### **X, Y and Z Lands**

Categorizing lands as X, Y and Z was the method used to determine responsibilities for regeneration of areas harvested before and after April 1, 1995 as part of the negotiations leading to the SFL. At the time of SFL signing, previously harvested areas on the Armstrong Forest were classified according to date of harvest and renewal activities completed and a map of the areas was produced and included with the SFL document (commonly referred to as the X, Y, Z map). According to the SFL, Norampac must meet silviculture standards on class X and Y lands and complete tending, as necessary, on class Z lands.

Norampac was unable to locate the original map for this audit but re-created the map according to the X, Y, Z definitions in the SFL document. Norampac also produced area summaries (X = 6,835 ha, Y = 27,843 ha, Z = 8,005 ha) and a summary of activities completed to date, including:

- About two-thirds of X lands received site preparation and planting or seeding treatments. Almost one-third also received tending. Over half of the X lands are now FTG as per assessments completed in the 2001-2006 term.
- A portion of Y lands has received one or more silviculture treatments and over half is now FTG.
- About 12% of Z lands have been tended to date and over 35% is currently FTG.

Some of these treatments were confirmed during the field audit. FTG areas were also viewed.

### **Free-to-Grow Assessments**

According to the Trend Analysis Report, Norampac completed 11,588 ha of FTG assessment over a six-year period (2000-2006, see Section 3.7.3 of the Trend Analysis Report in Appendix A for an explanation on why six years was used). This was about 68% of planned. Of the area surveyed, 7,931 ha were declared FTG (also about 68%). According to annual reports, most of the non-FTG area met height and stocking requirements but require treatment to remove the high hardwood component, or are areas which need more height growth to be considered FTG.

For the five-year term 2000-2005, 6,855 ha were assessed for FTG status and 5,124 ha (75%) were determined to be a regeneration success (i.e. FTG). About 3,554 ha (69%) of the FTG area was determined to be a silviculture success. (Note that the silviculture success rate has not been fully determined for assessments completed in the final year of the audit term). Therefore, approximately 70% of the treatments applied resulted in the desired forest unit; the remainder met FTG standards for other forest units. This statistic gives a good indication of Norampac’s ability to meet the desired future forest condition on the Armstrong Forest. At the forest unit treatment level, it is apparent that extensive and select intensive treatments to the more pure conifer units are more problematic than similar treatments to mixed conifer condition (from 2004-2005 Annual Report, Table AR-14). This type of information should be carefully examined by Norampac when modeling post-harvest silviculture trends in the next FMP.

FTG assessments generally occur five to ten years following disturbance, based on individual SGRs. According to the Trend Analysis Report, actual harvest in the 1990-2005 term was 54,145 ha and 37,476 ha were assessed, and of this over 17,000 ha were assessed in the 1995-2000 term. Considering there is normally a five- to ten-year gap between harvest and renewal assessment, the difference between area

harvested and assessed in the 15-year term is appropriate (i.e. 54,145 ha minus 37,476 ha equals 16,669 ha - just under the average five-year harvest level of 18,048 ha).

Looking into the future, Table FMP-28 in the 2005-2010 FMP indicates almost 12,000 ha to be assessed in the 2005-2010 term. Considering the large harvest area in the 1995-2000 term (26,370 ha) and the under-achievement of assessments during the 2001-2006 term (68% as discussed above), the amount of assessment forecast in Table FMP-28 may be deficient. Norampac recognizes the need to complete a significant number of FTG assessments in the 2005-2010 term and this is discussed in the Year-Ten Annual Report: "...increased assessments of renewal activities should be conducted early in the 2005-2010 FMP period to address the backlog of assessments not completed during the 2000-2005 FMP period. These assessments will provide an indication of the success of regeneration efforts on the Armstrong Forest". The audit team concurs with Norampac's assessment and offers the following suggestion.

**Suggestion 26: Norampac Inc. should determine if the forecast amount of assessment to be completed in the 2005-2010 term is sufficient to assess all eligible areas.**

FIM compliant results of ground and aerial FTG surveys completed during the term were incorporated into the GIS through hand entry from hard copy sheets. FRI was updated for stands deemed FTG, including records of stocking, species composition, and height information. The Company completed the process by checking updated information in the GIS and verifying FTG calls. The Company also stratified FTG areas by original prescription to allow determination of silviculture success by treatment.

## 4.0 Summary of Conclusions and Recommendations

### Commitment

Norampac is a company owned by Cascades Inc. (50%) and Domtar Inc. (50%) and it operates based on two fundamental values: a social conscience, and respect for environmental resources. The company meets its social commitment through producing recyclable products, achieving environmental ISO accreditations, investing in research, and providing donations to charitable groups and other socially responsible organizations.

Norampac has contracted the management of the SFL to Domtar. Domtar's overarching corporate policy statement "*A forest for all, for always*" effectively captures its commitment to sustainability. Domtar also has well developed, detailed policy documents underscoring its commitment to SFM including a Forest Policy, an Environmental Policy, and a Fibre Use and Sourcing Policy.

MNR Forest Division has a vision and mission statement addressing their commitment to SFM by "...providing balanced environmental, social and economic benefits now and for the future." All forest policies and management practices on Crown lands must conform to the Policy Framework for Sustainable Forests, which covers such matters as harvesting and regeneration, the management of old-growth forests, and the protection and conservation of non-timber values.

Based on the interviews, site visits and review of the documentation, the audit team is satisfied that MNR and Norampac were working towards the commitments and were continually striving to improve. No recommendations are offered related to the IFAPP principle of sustainability.

### Public Participation

The Armstrong LCC has performed well. One recommendation and one suggestion are directed at the MNR to assist the LCC in its meetings. The audit team noted that the LCC was effective despite the relatively small population from which it can draw its members, and compliments the Armstrong LCC on its volunteerism and dedication.

Consultation and dialogue with the public is an important component of managing Ontario's forests. One recommendation addresses the need to ensure the Ministry of the Environment is included in the audit scope and the other so that the Ministry of the Environment adheres to the requirements of the FMPM.

There are two Aboriginal communities within or adjacent to the Armstrong Forest: Whitesand First Nation and Namaygoosisagagun (the community of Collins). Although Namaygoosisagagun is not recognized by Indian and Northern Affairs Canada as an official band with reserve status, they were invited to participate in the forest management planning process along with Whitesand First Nation. Both of these Aboriginal communities opted for the FMNCP choosing to hold information centres in their respective communities.

Both Whitesand First Nation and Namaygoosisagagun were also invited by MNR to sit on the planning team for the 2005-2010 FMP and both accepted and had representation. A Memorandum of Agreement between Whitesand First Nation and MNR was signed in December 2000. Whitesand First Nation was satisfied with the working relationships with both Norampac and MNR.

Namaygoosisagagun requested a bump-up of the Arrnstrong Forest 2000-2005 FMP and believed it was not receiving the full benefits from the Forest. The community was not opposed to forest management activities but requested resolution to many of the issues prior to commencement of forest management activities in their identified traditional land use area. One result is an "Enhanced Ongoing Consultation Agreement" between Namaygoosisagagun, MNR, Domtar, and Norampac that was signed in January 2004.

The audit team recognizes the concerns of Namaygoosisagagun but since the formal agreement has been in place for only two years, offers a suggestion to all parties to continue their dialogue and increase employment benefits from the Forest to Namaygoosisagagun.

The audit team recognizes the efforts made by MNR, Norampac, the Aboriginal communities and overlapping license holders in increasing the accrual of benefits to the two Aboriginal communities on the Forest with a best practice.

Six recommendations and one suggestion are given to MNR to ensure that the public consultation process is completed as stipulated in the FMPM.

### **Forest Management Planning**

The planning team was faced with a number of complex issues including the implementation of caribou guidelines and remote tourism. Given the complexity of the issues it was evident that the parties were able to maintain good professional relationships throughout the process.

There is ample evidence to suggest that remoteness, viewscapes, roads, access, and noise were the key principles used by the parties in developing prescriptions for the forest management plan. Norampac took a very proactive approach in addressing the concerns of forest stakeholders. After developing detailed prescriptions for inclusion in the FMP there seemed to be little interest by the parties in developing further documents such as Resource Stewardship Agreements to define the business relationship and no RSAs were signed.

Several recommendations dealing with NRVIS requirements are provided to improve submission deadlines and provision of digital information.

The audit team noted that the severe early-winter storm in 2001, the "snowdown" event, which created widespread damage on the Forest combined with the current MNR upgrade of FRI procedures and standards, warrants a review to determine if planning schedule changes and an early FRI renewal is possible.

Some deficiencies in wildlife habitat and landscape processes planning were of concern to the audit team and a recommendation is given to have the MNR undertake a scientific peer review of the underlying assumptions in all forest management planning and modeling tools.

Representatives from the Armstrong LCC and the Aboriginal communities expressed concerns about the social and economic issues impacting their communities. One recommendation to include Namaygoosisagagun in the socio-economic profile of the next forest management plan is given to MNR.

Objectives and targets in the 2005-2010 FMP addressed forest diversity, socio-economics, forest cover and silviculture topics as required by the CFS and FMPM. Mandatory management alternatives were analyzed and documented as required by the FMPM. The FMP management alternatives were analyzed with SFMM and the results and input assumptions were discussed in the FMP text and Analysis Package. The FMP provided a solid discussion of the assessment of forest sustainability and objective achievement between management scenarios.

The planning team for the 2000-2005 FMP adopted a three-tiered management system reflecting the relative degree of caribou management intensity. The system was continued in the 2005-2010 FMP with refinements to improve its application on the Forest. The Moose-Caribou Integration Zone was developed using professional judgement to design for the Armstrong Forest a management system based on knowledge of wildlife species and their use of forested habitats, and the forest ecology of the Forest. Further refinement of the three-tiered management system for the 2005-2010 FMP exemplifies continuation of the adaptive management process used in its original development. The audit team

assigns a best practice to the planning team in the development, application and continued refinement of the three-tiered management system.

Operational planning including AOCs, silviculture, harvest, and access were completed as required with a few deficiencies identified with some silvicultural planning that warranted three suggestions and one recommendation. The recommendation is directed to Norampac to fully describe the monitoring and assessment programs in the next forest management plan.

The review and approval of the 2005-2010 FMP followed the process as outlined in the 1996 FMPM. The required alterations were well done and professional. However, the audit team noted that the high number of alterations, although not out of the norm for plans in this region, represent a significant workload both in generating the alterations and in addressing them. The audit team believes that the number of alterations is a function of systemic problems rather than poor workmanship. For this reason, two suggestions are made to improve the process.

One suggestion is directed to Corporate MNR to review the circumstances related to a change in stand allocation in lieu of fines with regard to a minor trespass.

### **Plan Implementation**

Area of Concern prescriptions viewed by the audit team were in compliance with the prescriptions as described in the FMP except in those instances where compliance inspections had already reported inconsistencies. The harvest followed planned areas and there were no trespasses or other significant compliance issues on the majority of harvest blocks. Frequent but relatively minor compliance issues dealing with tree retention, wasteful practices, inconsistent slash management and poor utilization have resulted in a recommendation directed at both MNR and Norampac to continue efforts to improve harvest compliance with regulations as they relate to utilization and tree retention. A suggestion to take into account the capacity of operators is directed to both MNR and Norampac.

Most renewal and tending prescriptions completed during the audit term were consistent with the FMPs, AWSs and ARs. Most treatments viewed were also appropriate and effective and many areas treated during the audit term appear to be headed towards meeting FTG targets. The audit team directed three recommendations to the Company dealing with inappropriate use of CLAAG prescriptions and tending treatments that did not sufficiently reduce hardwood competition and ensuring Forest Operation prescriptions are updated.

A number of non-compliances related to renewal and tending operations during the audit term were noted. Renewal and tending non-compliances are rare and the number and varied nature of the non-compliances that occurred during the term is of concern. Concerns regarding renewal and tending non-compliances as well as the harvest non-compliance and the ineffective treatments discussed earlier, along with the fact that effective pre-harvest assessments are not occurring, lead the audit team to believe that the on-the-ground presence by the SFL holder is not adequate to properly implement the forest management program detailed in the 2005-2010 FMP. A recommendation is, therefore, directed to the Company to ensure adequate human resources are allocated.

The audit team examined numerous water crossing installations (Figure 25) and removals with rehabilitation that had been completed during the term as well as aggregate pit development and decommissioning. Two suggestions are presented dealing with slope angle and stabilization at water crossings and the choice of environmental impacts from operational activities. A recommendation dealing with the proper decommissioning of inactive aggregate pits is directed to Norampac.

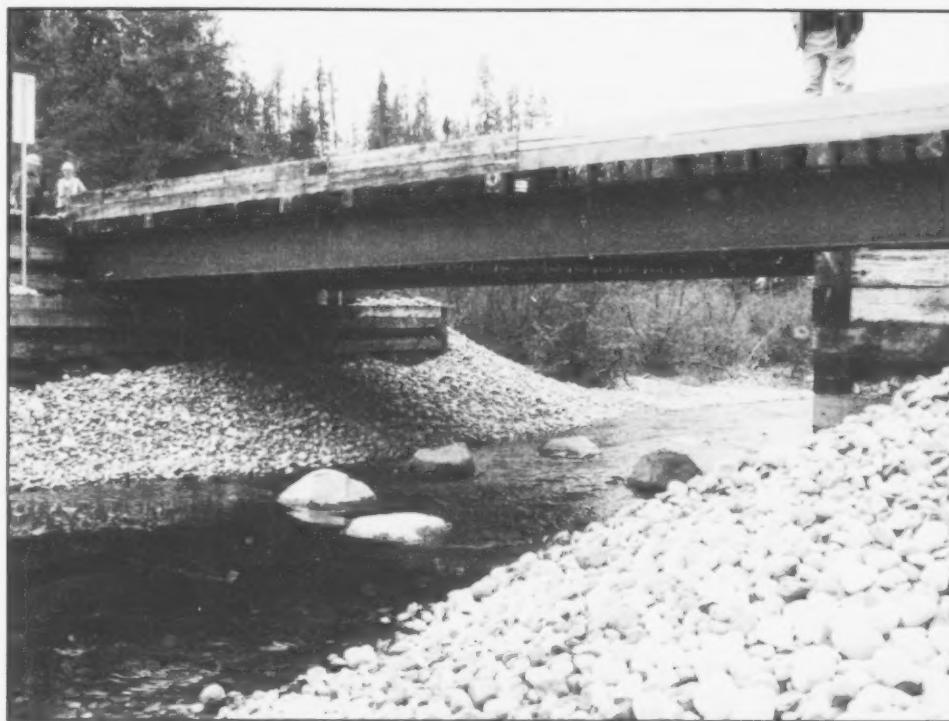


Figure 25. Excellent water crossing recently installed on the Obonga Lake Road.

### **System Support**

Domtar's comprehensive EMS and thorough AWS meetings held throughout the year are effective mechanisms conveying new information and requirements to Overlapping Licence holders and contractors.

### **Monitoring**

Two suggestions are given to Norampac, one to improve aerial pre-tending and free-to-grow surveys and the other to improve the administration of aerial herbicide application. A recommendation is given to the Company to make certain that the monitoring assessment program is adequate for assessing the effectiveness of all silviculture treatments.

MNR compliance staff are conscientious and have a good understanding of the compliance program. Interviews suggested a level of dissatisfaction with the compliance program and the difficulty for staff to implement the reporting phase of the program given the distances involved and the amount of time required to complete reporting requirements associated with inspections. Norampac and BFPL staff show a good understanding of the compliance program. However, report submissions by all parties were often late while verifications of non-compliances were not always completed by the MNR. The audit team directs a recommendation to all parties to meet the required timelines.

The annual report text provided good summaries of operations on the Forest during each year. The MNR and Company are given a suggestion to ensure the tabular portion of the Condition 34 Report is complete.

The audit team reviewed the Year-Ten Annual Report which was produced instead of a Report of Past Forest Operations (RPFO) to cover the 2000-2005 FMP term in accordance with the phase-in requirements of the 2004 FMPM. Although late, the Year-Ten Annual Report was found to be very well

written and complete in most respects. Norampac is directed through a recommendation to include a thorough discussion of silviculture effectiveness in the next required Annual Report.

### **Achievement of Management Objectives and Forest Sustainability**

The audit team reviewed the management objectives associated with the 1995-2000 Timber Management Plan and the 2000-2005 FMP which provides a review of the progress towards meeting the objectives by indicating whether each objective was met, not met, partially achieved or still in progress. Related recommendations or suggestions in the audit report, if applicable, are also identified. A summary of the status of the 2005-2010 FMP objectives is also provided, but since only the first year of the audit term has been audited (i.e. 2005-2006), only general comments are given.

The Year-Ten Annual Report provided a comprehensive discussion of the management objectives and concludes with a list of recommendations that, if considered, would assist in maintaining the long-term management direction detailed in the 2000-2005 FMP.

The Comparison and Trend Analysis of Planned vs. Actual Forest Operations Report (Appendix A) was submitted on time and met the requirements of the IFAPP. Some minor corrections were required to ensure the data matched the source documents and the revisions were completed satisfactorily by Norampac.

Based on a review of the 2005-2010 FMP, interviews with Norampac and MNR staff, interviews with the LCC, overlapping licensees, Aboriginal community representatives, public input, field observations, and the review of the forest management planning documentation, progress is evident in all of the criteria utilized in determining if the forest is being managed in a sustainable manner. The audit team notes that the long-term health and vigour of the Forest is being provided for as per the CDSA.

The age-class gap accounts for the forecasted decrease in harvest levels over the next 30 years. The higher forecasted yields are a result of the better management of planting densities in the current 10-30 year age classes as compared to those originating from fire, but the effect on the allowable harvest level will not take place until 30 or more years from now (i.e. in 2055+).

The audit team believes the Forest is being managed in a sustainable manner but because the level of harvest is forecast to decrease over the next 30 years, the criterion *Multiple Benefits to Society* can only be partially met. If the current age-class structure with its associated "age-class gap" is correct (see Figure 4, Section 2.2.2), a continuous even flow of forest product is not possible or forecast.

### **Contractual Obligations**

The audit team received a significant amount of input and concerns from Overlapping License holders, Appendix E wood supply commitment holders, and the auditees about the wood flow on the Forest. The Appendix E wood supply commitments for both Longlac Wood Industries and Neenah Paper were not met. Based on the considerable input the audit team received on the issues of wood flow and allocations, the complexities of past and existing business agreements in place, the reality of economic wood flow, and because of the many changes occurring in the forest industry at this time, the audit team believes the entire Appendix E approach to wood supply commitments would benefit from a review. Changing the wood directives should be the first step since these are based on market and mill requirements which have changed considerably. A suggestion is given to incorporate the principles listed in the report Towards Resolving Utilization Issues-A process to Manage Unutilized Fiber to resolve the Appendix E wood supply commitments and a recommendation is directed towards MNR to determine if the Appendix E approach to wood supply commitments needs to be replaced with a different process. The audit team noted that Appendix E of the May 6, 2006 version of the SFL has addressed some changes in the wood directives.

A suggestion is directed towards Corporate MNR to consider lengthening the time to prepare an action plan report from two months to six months to accommodate the increasing report complexity and requirements arising from Independent Forest Audits.

Of the 21 recommendations from the 2001 IFA, nine were directed towards MNR, ten were directed towards the Company and two recommendations were directed jointly to both MNR and the Company. The action plan and action plan status report prepared by the Company and MNR were well written and met requirements. Based on the field visits, interviews, and public input, the audit team identified some action items in recommendations from the 2001 IFA which were not completely addressed in a satisfactory manner and need continued attention to be completed.

A review of MNR statements for the status of forestry futures charges found the Norampac account to be satisfactory. Norampac's five-year analysis of the forest renewal charges was completed as required.

Although the audit team makes a suggestion for improving communication on employment opportunities, it was obvious that a considerable effort has been made by Norampac and MNR with both Whitesand First Nation and Namaygoosisagagun. The audit team provides a best practice to Norampac, MNR, BFPL, Whitesand First Nation and Namaygoosisagagun to acknowledge the attempts and efforts made in providing employment opportunities to the Aboriginal communities and encourage the continuation of these endeavours. The level of participation in forest management activities by Aboriginal people on the Armstrong Forest is provided.

A suggestion is provided to the Company to ensure that the forecast amount of FTG assessment is sufficient.

### Conclusion

The audit team believes that with the exceptions noted in the audit report, management of the Armstrong Forest was in compliance with the legislation, regulations and policies that were in effect during the term of the audit. The Armstrong Forest was managed in compliance with the terms of SFL number 542255 held by Norampac. Forest sustainability is being achieved however, if the current age class structure is correct, a continuous even flow of product is not forecast.

**Recommendation 29: Based on the outcome of this audit and performance with respect to its contractual obligations, the audit team recommends the Minister extend the term of the Norampac Inc. Sustainable Forest Licence 542255 for a further five years.**

Table 14 provides a summary by responsible party of the number of recommendations, suggestions and best practices identified during the audit. A complete list is provided in Table 15.

Table 14. Summary of recommendations, suggestions and best practices by responsible party.

	Norampac	MNR	Norampac and MNR	Total
Recommendations	9	14	6	29
Suggestions	11	11	4	26
Best Practices			2*	2

\* Buchanan Forest Products Ltd., Whitesand First Nation and Namaygoosisagagun were also acknowledged in one of the Best Practices.

Table 15. Summary of recommendations, suggestions and best practices.

<b>Principle 1: Commitment</b>	
None	
<b>Principle 2: Public Participation</b>	
<b>Recommendations</b>	
1	The Ministry of Natural Resources must ensure that the Local Citizens Committee reviews and updates its Terms of Reference to meet the requirements of the 2004 Forest Management Planning Manual.
2	The Ministry of Natural Resources must ensure that forest management planning notices to Aboriginal communities are placed in the Aboriginal media identified in the Terms of Reference of the next forest management plan.
3	Corporate Ministry of Natural Resources must work with the Ministry of the Environment (MOE) to ensure MOE's adherence to the requirements of the Forest Management Planning Manual and the Forest EA Declaration Order MNR-71, Condition 8, with respect to ensuring timely decisions are made on requests for individual environmental assessments.
4	Corporate Ministry of Natural Resources must change the scope of the Independent Forest Audit to include all parties who have an obligation to follow the processes outlined in the Crown Forest Sustainability Act and its regulated manuals.
5	The Ministry of Natural Resources must follow up with Lake Superior Development Trust to ensure the Native Background Information Report for Whitesand First Nation is delivered.
6	The Ministry of Natural Resources must ensure that the Notice of Annual Work Schedule Public Inspection and aerial herbicide program notices to Aboriginal communities meets the requirements of the Forest Management Planning Manual with respect to notices in the Aboriginal media.
<b>Suggestions</b>	
1	The Ministry of Natural Resources should consider transferring some of the practices used by the Nipigon East Area Local Citizens Committee to the Armstrong Forest Local Citizens Committee, including the use of registers for action items and recommendations.
2	The Ministry of Natural Resources should maintain accurate and complete records of consultation with Aboriginal communities in order to be able to demonstrate that requirements of the Forest Management Planning Manual are being met.
<b>Principle 3: Forest Management Planning</b>	
<b>Best Practice</b>	
1	The planning team is commended for the refinement and use of the three-tiered management system for the 2005-2010 Forest Management Plan, as originally developed for the 2000-2005 Forest Management Plan.
<b>Recommendations</b>	
7	Norampac Inc. must ensure that all required text is included in the "Geology, Soils and Sites" and "Historic Forest" sections of the next forest management plan.
8	The Ministry of Natural Resources must ensure that Natural Resource Values Information System information is provided for the forest management planning process and annual work schedule preparation as required by the Forest Information Manual.
9	The Ministry of Natural Resources must ensure digital moose aquatic feeding area information is consistent with planimetric boundaries to ensure utility in the forest management planning process.

Continues on next page

Table 15 continued.

<b>Principle 3: Forest Management Planning <i>continued</i></b>	
10	The Ministry of Natural Resources and Norampac Inc. must review the status of the Forest Resource Inventory (FRI) and consider renewing the FRI and or changing Forest Management Plan schedules to account for the changes in the Forest, FRI methods and the Forest Management Planning Manual requirements.
11	Corporate Ministry of Natural Resources must undertake timely scientific peer reviews of the underlying assumptions in its forest management planning modeling tools developed by MNR on a periodic basis (i.e. every five years).
12	The Ministry of Natural Resources must include Namaygoosisagagun in the socio-economic profile of the next forest management plan.
13	Norampac Inc. must ensure that all required text regarding the monitoring and assessment program is included in future forest management plans.
14	The Ministry of Natural Resources must ensure that all amendments are distributed to the required locations and within the required timelines.
<b>Suggestions</b>	
3	The Ministry of Natural Resources should develop a procedure to assist in the updating of mailing lists related to resource-based tourism establishments.
4	Corporate Ministry of Natural Resources should make available the results of Recommendation 11 to the Provincial Forest Technical Committee to assist with review and revision of the Guides (MNR-71 Condition 31 and Condition 38c).
5	Corporate Ministry of Natural Resources should review the 2004 FMPM and consider reintroducing the requirements for reporting changes in wildlife habitat over past planning periods and disturbance levels in second order watersheds.
6	Norampac should, during the preparation of the next forest management plan: <ul style="list-style-type: none"> <li>Review the assessment of areas set aside from harvesting and incorporate existing reserves into the SFMM landbase to provide the model with a more accurate reflection of areas reserved from harvesting;</li> <li>Review succession rules during plan development to ensure agreement between pre- and post-succession volumes.</li> </ul>
7	Norampac Inc. should consider re-instating target stocking or updating the measure of site occupancy in the Silvicultural Ground Rules to correlate with the <u>Well-Spaced Free-Growing Regeneration Manual</u> (i.e. list the target and minimum number of well-spaced free-growing trees).
8	Norampac Inc. should revise the Silvicultural Ground Rules such that acceptable species lists include those species that have a high potential for being on site post-harvest. These adjustments must also be reflected in post harvest succession rules in SFMM and should be consistent with silvicultural objectives.
9	Norampac Inc. should include all required renewal support information in future forest management plans.
10	The Ministry of Natural Resources should evaluate the roles, responsibilities, and training of forest management planning and review teams to reduce the number of required alterations.
11	Norampac Inc. should develop procedures to ensure a thorough plan review prior to submission of the next draft forest management plan.
12	The Ministry of Natural Resources should review the requirement to send amendment documentation to Forest Management Branch and a location in Toronto, and in particular, the format of such documentation.

Continues on next page.

Table 15 continued.

<b>Principle 3: Forest Management Planning <i>continued</i></b>	
13	The Ministry of Natural Resources should review the approval process for amendments to identify ways of reducing approval times.
14	Corporate Ministry of Natural Resources should review the circumstances related to the change in allocation in lieu of fines in the context of the existing regulatory framework and adjust procedures or regulations accordingly if or where determined to be appropriate.
<b>Principle 4: Plan Implementation</b>	
<b>Recommendations</b>	
15	The Ministry of Natural Resources and Norampac Inc. must continue efforts to improve harvest compliance with the regulations as they relate to utilization and tree retention.
16	The Ministry of Natural Resources must initiate actions to mitigate site damage in Block 510 and to fully utilize the harvested wood.
17	Norampac Inc. must determine the effect of the unplanned treatment on the pertinent portions of Block 533 and determine if remedial treatments are required to ensure renewal success.
18	Norampac Inc. must assess Block 400 in the near future to determine if artificial treatments may be required to meet regeneration standards within the time allotted in the Forest Management Plan.
19	Norampac Inc. must ensure that Forest Operation Prescriptions are updated to reflect actual on-the-ground conditions.
20	Norampac Inc. must ensure adequate human resources are dedicated to Forest Management Plan implementation on the Armstrong Forest.
21	The Ministry of Natural Resources and Norampac Inc. must ensure that all inactive aggregate pits are properly decommissioned.
<b>Suggestions</b>	
15	Norampac Inc. should examine options for recovering productive forest area from older slash piles.
16	The Ministry of Natural Resources and Norampac Inc. should take into account the capacity of operators in allocating areas for operations as part of a well defined risk management strategy within the compliance plan.
17	Norampac Inc. should monitor the health of the white spruce plantations on a periodic basis and renew its white spruce seed sources to ensure seedlings are properly adapted to local conditions.
18	Norampac Inc. should ensure that all water crossings are properly installed.
19	The Ministry of Natural Resources should develop a clear, science-based and balanced approach to provide direction for the location of branch roads where alternatives involve impacting the integrity of values.
<b>Principle 5: Systems Support</b>	
None	
<b>Principle 6: Monitoring</b>	
<b>Recommendations</b>	
22	Norampac Inc. must review its monitoring assessment program to ensure that it is adequate for assessing the effectiveness of all silviculture treatments.
23	The Ministry of Natural Resources and Norampac Inc. must ensure that timelines for reporting under the Forest Operations Inspection Program are met and that all inspections are reported as required.
24	Norampac Inc. must include a thorough discussion of silviculture effectiveness in the next required Annual Report.

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Table 15 continued.

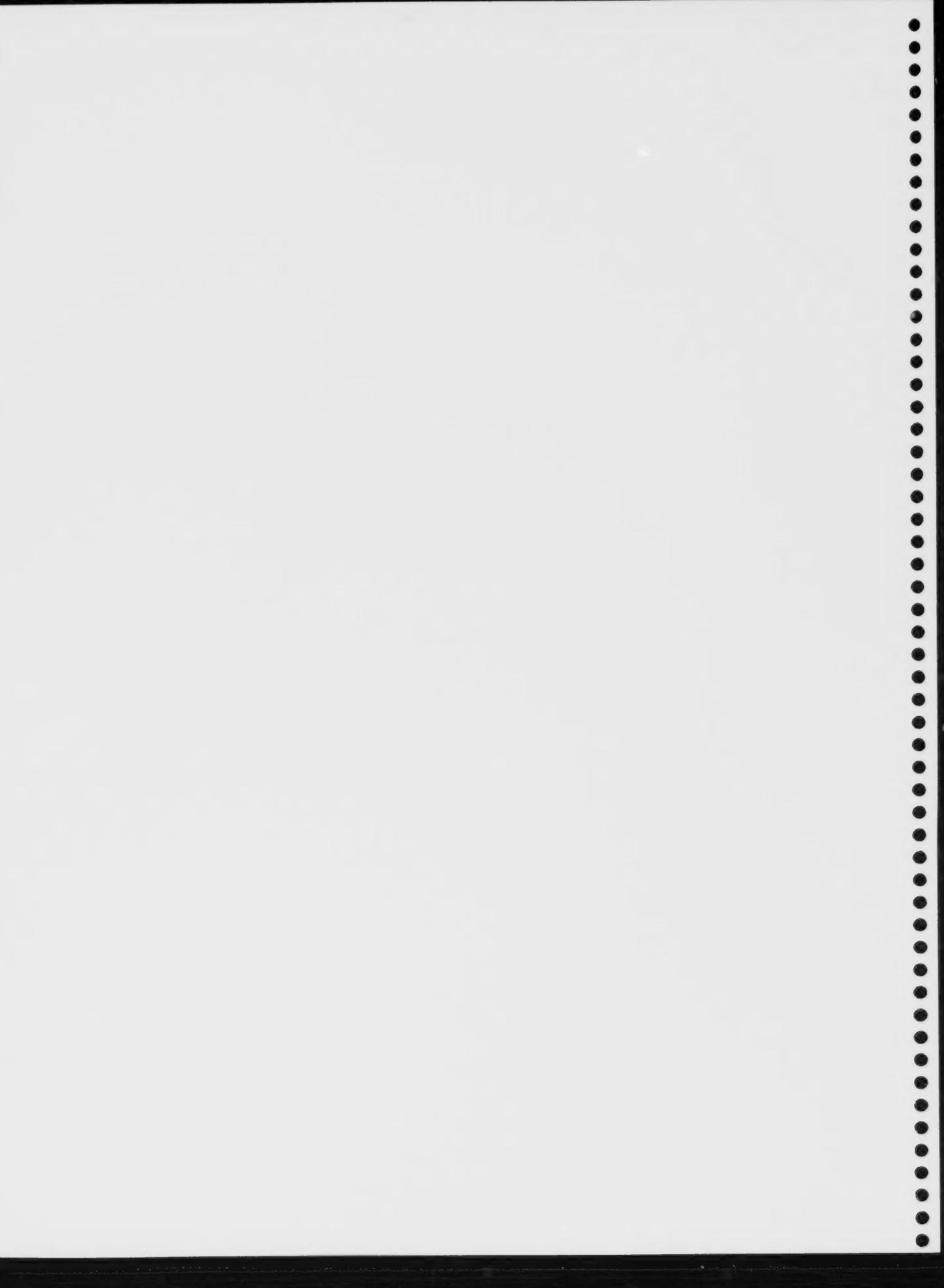
<b>Principle 6: Monitoring <i>continued</i></b>	
<b>Suggestions</b>	
20	Norampac Inc. should consider completing aerial pre-tending and free-to-grow assessments during or near the end of the leaf-on period.
21	Norampac Inc. should formalize assessments of aerial tending projects, add quality control stipulations to aerial tending contracts, and complete formal surveys of ground tending projects, as per contract specifications.
22	The Ministry of Natural Resources and Norampac Inc. should ensure the value of contracts is included on the tabular portion of the Condition 34 Report.
<b>Principle 7: Achievement of Management Objectives and Forest Sustainability</b>	
None	
<b>Principle 8: Contractual Obligations</b>	
<b>Best Practice</b>	
2	Norampac Inc., Ministry of Natural Resources, Buchanan Forest Products Ltd., Whitesand First Nation and Namaygoosisagagun are commended for working together to provide increasing employment opportunities in forest management activities for Aboriginal community members.
<b>Recommendations</b>	
25	Corporate Ministry of Natural Resources must determine if the approach to wood supply commitments in Appendix E of the Sustainable Forest Licence needs to be replaced with a different process.
26	Norampac Inc. and Neenah Paper Inc. must complete a Memorandum of Agreement as stipulated in Appendix E of the Sustainable Forest Licence.
27	Norampac Inc. and the Ministry of Natural Resources must meet the Independent Forest Audit Status Report submission date.
28	Norampac Inc. and the Ministry of Natural Resources must continue to complete the action items arising from the recommendations in the 2001 Independent Forest Audit as follows: <ul style="list-style-type: none"> <li>The Native Background Information Report for Whitesand First Nation must be completed (see Recommendation 5).</li> <li>Complete testing the criteria for identifying specific roads or sections of roads for rehabilitation in those areas identified as having potential future caribou habitat.</li> <li>The Appendix E wood supply commitment to Longlac Wood Industries and Neenah Paper Inc. was not fully met during the audit term (see Recommendation 26).</li> <li>Complete the responsibility matrix for maintenance of older water crossings.</li> </ul>
<b>Suggestions</b>	
23	The Ministry of Natural Resources and Norampac should incorporate the principles listed in the report <u>Towards Resolving Utilization Issues-A Process to Manage Unutilized Fiber</u> to resolve the wood supply commitments in Appendix E of the Sustainable Forest Licence.
24	Corporate Ministry of Natural Resources should consider lengthening the time to prepare an action plan report from two months to six months.
25	The Ministry of Natural Resources and Norampac Inc. should ensure Namaygoosisagagun is in mutual agreement with the terms of reference in the "Enhanced Ongoing Consultation Agreement" and how employment opportunities can be fulfilled.
26	Norampac Inc. should determine if the forecast amount of assessment to be completed in the 2005-2010 term is sufficient to assess all eligible areas.

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Table 15 continued.

<b>Conclusion</b>	
The audit team believes that with the exceptions noted in the audit report, management of the Armstrong Forest was in compliance with the legislation, regulations and policies that were in effect during the term of the audit. The Armstrong Forest was managed in compliance with the terms of SFL number 542255 held by Norampac. Forest sustainability is being achieved; however a continuous even flow of product is not forecast.	
<b>Recommendation</b>	
29	Based on the outcome of this audit and performance with respect to its contractual obligations, the audit team recommends the Minister extend the term of the Norampac Inc. Sustainable Forest Licence 542255 for a further five years.

**Appendix A**  
**Comparison and Trend Analysis of**  
**Planned vs. Actual Forest Operations Report**



**NORAMPAC INC.  
ARMSTRONG FOREST SFL # 542255  
INDEPENDENT FOREST AUDIT**

**COMPARISON AND TREND ANALYSIS OF PLANNED  
VERSUS ACTUAL FOREST OPERATIONS**



**Norampac**  
Red Rock Division

Prepared By:

**Domtar**

RPF Seal



Dated: June 7, 2006

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## 1.0 Introduction

This Comparison and Trend Analysis of Planned versus Actual Forest Operations for the Armstrong Forest has been prepared and certified by Registered Professional Foresters, in accordance with the direction provided in Appendix C of the 2006 Independent Forest Audit Process and Protocol (IFAPP).

The Armstrong Forest is managed under Sustainable Forestry Licence - Number 542255, which came into effect on April 24, 1997. A detailed description of the Armstrong Forest is contained in the Management Unit Description section of the 2005-2010 Forest Management Plan (FMP) for the Armstrong Forest. This particular report is specific to managed Crown land only, although the achievement of some management objectives and forest sustainability depend on the contributions of all land ownerships (including parks, conservation reserves, withdrawals, exclusions and patent land for example).

The 2006 Independent Forest Audit (IFA) covers the period from April 1, 2001 to March 31, 2006, which somewhat complicates matters since it overlaps two different planning terms. The 5-year forest management planning cycles on the Armstrong Forest have been from 1990 to 1995, 1995 to 2000, 2000 to 2005, etc. For the purpose of reflecting trends most accurately in this report, while still meeting the IFAPP requirements, the "Current Term" in following text and tables, refers to the 2005-10 FMP. Unfortunately, in tables presenting "planned" versus "actual" comparisons, actual data is not yet available for the current term. The 2005-06 Annual Report will not be available for submission until November, 2006. Information relating to the three previous planning terms (from 1990 to 2005) has also been summarized for comparative purposes. All management plans over this time period were prepared by Domtar Inc.

This report includes the tabular and text requirements outlined in the IFAPP as well as a Synopsis of the 2004-05 Annual Report. With the implementation of the phase-in provision of the 2004 Forest Management Planning Manual (FMPM), annual reports prepared for the last year of plan implementation (such as the 2004-05 Annual Report for the Armstrong Forest) include additional "Year Ten Requirements". These additional requirements include much of the same information traditionally provided in a Report of Past Forest Operations (RPFO), which have essentially been replaced by the Year Ten annual reports. Accordingly, this trend analysis and comparison report also includes the following information relative to operations that occurred over the 2000-05 FMP period, including:

- an analysis of forest disturbances
- a review of renewal and tending activities
- a review of forest modeling assumptions
- a summary of independent forest audit action plans
- an assessment of objective achievement
- a determination of sustainability

It is appropriate to make note of a very severe natural occurrence that occurred during the period being audited. A snow storm followed by strong winds swept across the area north of Lake Nipigon on October 24, 2001. The resulting damage was geographically widespread, from Sioux Lookout in the west, north as far as the Area of the Undertaking, stretching across most of the Armstrong Forest (most severely across the middle portion), and affecting SFL areas to the east. Heavy accumulations of wet snow and ice in the upper portions of mature trees caused significant blowdown and snapping of treetops at various heights, and to differing degrees of severity. Two minor amendments to undertake salvage harvests were approved in 2002 (Coded # 30 and #31). Due to the significance of these efforts, and for a more accurate comparison, the salvage areas and volumes have been included with regular harvest areas and volumes in the tables of this report.

Another relevant point of interest is that the 2000-05 FMP was subject to a request for an individual environmental assessment (bump-up) submitted by Namaygoosigagun (community of Collins). The concerns related to operations in the vicinity of Collins and Rushbay Lakes (operating blocks 200, 201, 202). This bump-up request remained outstanding throughout the majority of the plan period, precluding

operations in operating blocks 200 and 202. A decision was made by the Ministry of the Environment on February 17<sup>th</sup>, 2005 that an individual environmental assessment was not required.

## 2.0 Trend Analysis Text and Tables

### 2.1 Summary of Total Area Under Management

Trend Analysis Table 1, accompanied by the supporting bar graph, documents the total area under management over four consecutive planning periods for the Armstrong Forest. The sources of information for this table and chart are Table 4.8.2 from the 1990-95 and 1995-2000 TMP's, and Tables FMP-1 and FMP-2 for the subsequent two FMPs.

A new, digital Forest Resource Inventory (the "1991 FRI") was completed in mid –1994, but not delivered in time to be used in the development of the 1995-2000 TMP. The 1976 FRI therefore continued to be used in the development of the 1990-95 and 1995-2000 TMPs, (updated each time) for the Forest. This is reflected with the similarity of area of the primary land types in the first two columns of Table 1 (from 1990 to 2000). Only minor shifts in the main working groups and B&S are evident during this 10-year period, mainly as a result of natural disturbance, harvesting, regeneration programs and areas being declared free-to-grow.

Much more significant changes are evident however, starting in the 2000-05 FMP planning period, as a result of significant landbase withdrawals that occurred in the mid and late 1990's. The notable reduction in Production Forest area between the 1995-2000 FMP and the 2000-05 FMP (approximately 41%) is the result of the expansion of Wabakimi Provincial Park and the implementation of the Ontario Living Legacy (OLL) Land Use Strategy, which involved the creation of the Lake Nipigon Conservation Reserve, Ogoki Lake Conservation Reserve and Whitesand Provincial Park.

Both of these government initiatives have resulted in a number of direct and significant landbase impacts on the Armstrong Forest. The Wabakimi Park expansion reduced the total size of the Forest by approximately 197,000 ha, and OLL reduced the size of the Forest by approximately an additional 100,000 ha. The Wabakimi Park expansion was officially announced in April of 1995, and the landbase reduction to the Forest as a result of park expansion became official with the signing of the Sustainable Forest License for the Forest on April 1, 1997. The OLL reduction was announced in March of 1999.

A new planning inventory was also used for the first time during the preparation of the 2000-05 FMP. The 1991 FRI, used in the development of the 2000-05 FMP was based on aerial photography flown in the summer of 1990. The FRI was produced through a joint effort by Domtar and the Ministry of Natural Resources. Domtar was responsible for collecting and compiling the FRI cruising information and submitting other update information to the MNR. MNR acquired the photography and produced the final map and data products based on the information provided by Domtar. Changes to the landbase (e.g., cutovers, roads) that took place between date of photography and compilation (1990-92) were also incorporated in the final product. The 1991 FRI is the first digital inventory to be produced for the Armstrong Forest.

Through its Geographical Information System (GIS) capabilities, Domtar was able to digitally update the inventory in order to account for depletions and accruals on the Forest since 1991. Actual field data (up to 1996-97 for depletions, 1997-98 for silvicultural activities and free-to-grow updates) were used in the updating process for the FMP. To allow time for plan preparation, estimates were derived to account for harvest depletions from 1997-2000, as well as from 1998-2000 for silvicultural and free-to-grow updates. These areas are reflected in the 2000-2005 column in Table 1.

In preparation for the Armstrong Forest 2005-10 FMP, the 1991 FRI was again updated to incorporate updated forest description information from forest management activities (clearcut harvest areas and natural events, including fire and blowdown). The FRI was further updated to 2005 (the beginning of the planning period) by ageing stands to 2000 ages, distributing barren and scattered areas and recent cutover areas to the appropriate forest units and age classes, and incorporating free-to-grow stands into

the landbase. Forecasted changes to the forest description based on the planned operations in the approved 2000-05 Forest Management Plan were also included in the update.

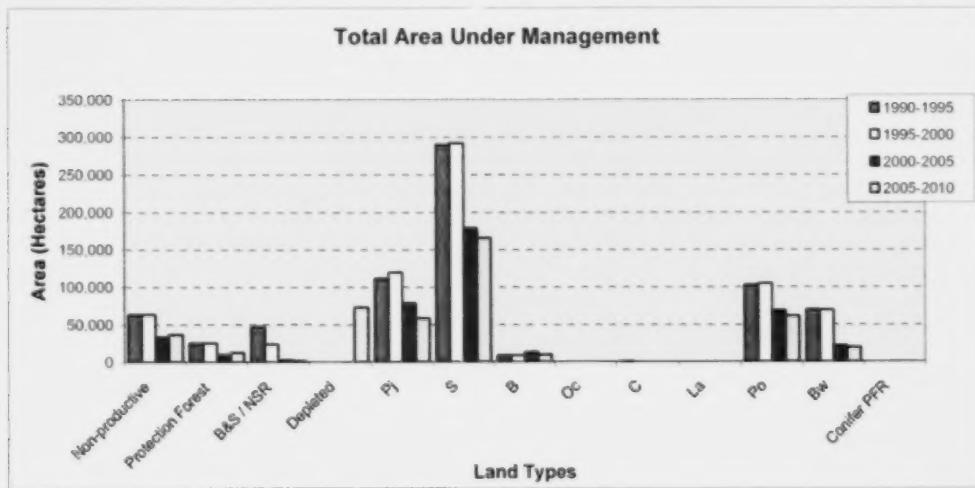
**2006 Independent Forest Audit**

**Table 1 - Summary of Total Area Under Management**

**MU: Armstrong Forest**

**Past and Current Plans - Crown Managed**

Land Type	Plan Term	Area in Hectares			
		1990-1995	1995-2000 <sup>2</sup>	2000-2005 <sup>3</sup>	2005-2010 <sup>4</sup>
Non-Forested					
Other Land		789	790	3,030	3,585
Forested					
Non-productive		63,614	63,614	33,259	36,895
Productive					
Protection		25,536	25,392	10,408	13,017
Production Forest					
B&S / NSR		47,124	23,689	3,139	1,893
Depleted		-	-	-	73,307
Forest Stands by Working Group					
Pw					
Pr					
Pj		111,233	119,392	78,784	58,502
S		290,201	292,309	178,557	165,404
B		8,736	8,762	13,361	9,879
Oc					
C		462		30	5
La				106	127
Po		102,459	104,670	68,800	60,995
Bw		69,456	69,371	21,850	19,577
Conifer PFR					
OH					
Total Production Forest		629,671	618,193	364,627	389,690
Total Forested Land		718,821	707,199	408,294	439,602



Sources:

1. Table 4.8.2 from the Armstrong Forest 1990-1995 TMP.
2. Table 4.8.2 from the Armstrong Forest 1995-2000 TMP.
3. Tables FMP-1 and FMP-2 from the Armstrong Forest 2000-2005 FMP.
4. Tables FMP-1 and FMP-2 from the Armstrong Forest 2005-2010 FMP.

The reader is referred to Section 1.0, Part One of The Analysis Package, contained in Appendix A1 of the 2005-10 FMP, for a detailed description of the preparation of the planning inventory. That section describes how various base themes were updated and compiled, how stand information was updated, including updates to the beginning of the plan term, data preparation for the Strategic Forest Management Model (SFMM) and provides a discussion of management decision information.

The Crown managed forest area has remained relatively stable over the 5-year period from 2000 to 2005. There is a 6.9% increase in Total Production Forest area in the current plan (2005-10 FMP), as compared to the previous term. This is, for the most part, due to the inclusion of the caribou calving reserves in the Crown Managed portion of the forest for the 2005-10 FMP (Calving Reserves were designated as Crown Unmanaged in the 2000-05 FMP). Other factors relate to differences associated with the base feature data provided by the MNR to Domtar for incorporation into the planning inventory (less buffers associated with streams and roads, water, management unit boundary and ownership layers, etc.).

Another noteworthy item reflected in the Current Forest column in Table 1 for the 2005-10 FMP is that 73,309 hectares were classified as "Depleted". During the preparation of the 2000-05 FMP these areas, for the purpose of long-term strategic modeling (using the Strategic Forest Management Model – SFMM), were represented as young growing forest stands. All FMP tables were prepared such that all land/stand classifications were summarized in a consistent manner. Thus, Tables FMP-1 and FMP-2 were prepared to reflect the modeling assumptions and MNR planning Direction (with no depleted areas reported). The 2005-10 FMP planning team on the other hand, in consultation with regional MNR planning specialists, represented the actual Depleted areas more accurately in SFMM and in Tables FMP-1 and FMP-2.

## 2.2 Description of Forest Units

The following set of tables shows the transition between the defined working groups and forest units for the period 1990 to 2005 on the Armstrong Forest.

Tables 2a through 2d show the transition between working groups and forest units. The sources of information for these tables are (in order of Table 2a to 2d): Section 4.8.3.2.1 of the Armstrong Forest 1990-95 TMP; Section 4.8.3.1.1.1 and Table 4.11 of the Armstrong Forest 1995-2000 TMP; Table FMP-8 of the Armstrong Forest 2000-05 FMP; and Table FMP-8 of the Armstrong Forest 2005-10 FMP.

As can be seen from reviewing Tables 2a through 2d, the forest units have changed considerably on the Armstrong Forest during the 1990 to 2010 period. Table 2a (1990-95) describes a very simple set of forest units which basically reflected the main working groups present on the Armstrong Forest. The overmature jack pine (greater than 100 years of age) was separated from the mature jack pine working groups, thereby creating two jack pine forest units based mainly on the FRI attributes of site class and age. The rationale for applying these two forest unit breakdowns at the time was based on the premise that on the Armstrong Forest, jack pine tends to deteriorate rapidly as it exceeds 100 years of age. The forest unit delineation allowed management of the total jack pine working group in a manner that does not allow stands to exceed 100 years of age. The rest of the forest units simply reflected the main working groups present on the Forest.

Table 2b reflects quite a change, showing a very detailed set of site specific forest units sorted on working group, but then further refined to reflect species composition and terrain. They also reflect a new direction in developing a set of hardwood forest units based upon the relative presence or absence of conifer in the poplar and birch working groups. The 1995-2000 TMP forest units reflect product requirements and management regimes over the range of conditions on the Forest. In recognition of the fact that virtually all of the softwood fibre was destined for sawmills initially, one of the primary considerations was the production of an optimum product for sawmills.

**Armstrong Forest – Independent Forest Audit Report**  
**Comparison and Trend Analysis of Planned versus Actual Forest Operations Report**

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**2006 Independent Forest Audit**

**Table 2a - Description of Forest Units for the 1990-1995 Period**  
**MU: Armstrong Forest**

Forest Unit		Forest Type	Main Working Group	Site Type(s) FEC Vegetation Types	Silvicultural System	FRI Parameters & Criteria
Code	Name					
Sp	Spruce	Conifer	Black Spruce and White Spruce		Clearcut	All spruce working groups
Pj I	Jack Pine I	Conifer	Jack Pine		Clearcut	All areas of jack pine working group less than 100 years old in site class X, 1,2,3
Pj II	Jack Pine II	Conifer	Jack Pine		Clearcut	All areas of jack pine working group greater than 100 years old in site class X, 1,2,3
Bf	Balsam Fir	Conifer	Balsam Fir		Clearcut	All balsam fir working groups
Hardwood	Hardwood	Hardwood	Poplar and White Birch		Clearcut	All poplar and white birch working groups

Source: Section 4.8.3.2.1 - Armstrong Forest 1990-1995 Timber Management Plan

Armstrong Forest – Independent Forest Audit Report  
 Comparison and Trend Analysis of Planned versus Actual Forest Operations Report

2006 Independent Forest Audit

Table 2b - Description of Forest Units for the 1995-2000 Period

MU: Armstrong Forest

Forest Unit		Forest Type	Main Working Group	Site Type(s) (ES =NW ONT. Forested Ecosites)	Silvicultural System	FRI Parameters & Criteria
Code	Name	Type				
Sp1	Upland Spruce	All upland spruce working groups not classified as lowland, rugged or PFR	Black Spruce and White Spruce	V15, 16, 19, 20, 24, 25, 30, 31, 32, 33, 34	Clearcut	spruce stands without larch or cedar, which are not pure Sp and are not classified as inoperable or PFR
Sp3	Lowland Spruce and Other Conifer	All lowland spruce working groups	Black Spruce, Larch and Cedar	V22, 23, 34, 35, 36, 37	Clearcut	all stands consisting of pure Sp or Sp with cedar and/or larch
Sp4	Rugged Spruce	Spruce stands growing on very steep slopes	Black Spruce and White Spruce			spruce stands classified as inoperable by photo interpretation
Sp5	Spruce PFR	Spruce stands typed as PFR in the FRI	Black Spruce and White Spruce	V28, 29, 30, 31, 32, 33	Clearcut	spruce stands typed as PFR in the 1976 FRI
Pj 1	Jack Pine	All jack pine stands not classified as rugged or PFR	Jack Pine	V17, 18, 26, 29, 30, 32	Clearcut	All jack pine stands nor classified as rugged or PFR
Pj 4	Rugged Jack Pine	Jack pine stands growing on very steep slopes	Jack Pine			jack pine stands classified as inoperable by photo interpretation
Pj 5	Jack Pine PFR	Jack pine stands typed as PFR in the FRI	Jack Pine	V28, 29, 30, 31, 32, 33	Clearcut	jack pine stands typed as PFR in the 1976 FRI
Bf1	Balsam Fir	All balsam fir stands not classified as rugged or PFR	Balsam Fir	V14, 15, 24, 25	Clearcut	All balsam fir stands nor classified as rugged or PFR
Bf 4	Rugged Balsam Fir	Balsam Fir stands growing on very steep slopes	Balsam Fir			balsam fir stands classified as inoperable by photo interpretation
Bf 5	Balsam Fir PFR	Balsam fir stands typed as PFR in the FRI	Balsam Fir	V25	Clearcut	balsam fir stands typed as PFR in the 1976 FRI
Po 1	Poplar Mixedwood	Poplar stands that have greater than 25% of conifer	Poplar	V1, 6, 7, 8, 9, 10, 11	Clearcut	Poplar stands that have greater than 25% of spruce and/or jack pine and/or balsam fir
Po 2	Poplar	Poplar stands that have less than 25% of conifer	Poplar	V1, 5	Clearcut	Poplar stands that have less than 25% of spruce and/or jack pine and/or balsam fir
Po 4	Rugged Poplar	Poplar stands growing on very steep slopes	Poplar			Poplar stands classified as inoperable by photo interpretation
Po 5	Poplar PFR	Poplar stands typed as PFR in the FRI	Poplar	V4, 5, 6, 7, 8, 9, 10, 11	Clearcut	Poplar stands typed as PFR in the 1976 FRI
Bw 1	Birch Mixedwood	White Birch stands that have greater than 25% of conifer	White Birch	V4	Clearcut	White Birch stands that have greater than 25% of spruce and/or jack pine and/or balsam fir
Bw 2	Birch	White Birch stands that have less than 25% of conifer	White Birch	V4	Clearcut	White Birch stands that have less than 25% of spruce and/or jack pine and/or balsam fir
Bw 4	Rugged Birch	White Birch stands growing on very steep slopes	White Birch			White Birch stands classified as inoperable by photo interpretation
Bw 5	Birch PFR	White Birch stands typed as PFR in the FRI	White Birch	V4, 5, 6, 7, 8, 9, 10, 11	Clearcut	White Birch stands typed as PFR in the 1976 FRI

Source: Section 4.8.3.1.1.1 and Table 4.11 of the Armstrong Forest 1995-2000 Timber Management Plan

Based on experiences from the 1995-2000 period, the forest units were further refined for the 2000-05 FMP, presented in Table 2c. In the 1995-2000 plan, there was only one jack pine forest unit and one upland spruce forest unit. These criteria did not differentiate between the pure, mixedwood or rugged stand conditions which often exist on the Forest. With the increased importance of conifer dominated mixedwoods in meeting habitat and ecological requirements, and the increased demand for hardwood from the Forest, it was essential to break out the mixedwood portion of these conifer forest units and track them separately in modeling and harvest allocations. The break point of 10% hardwood component or greater, which is required for the SpM and PjM forest units, was developed based on the observation that once jack pine and spruce working groups have more than a 10% hardwood component they develop along very different ecological pathways than pure stands.

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**Table 2c - Description of Forest Units for the 2000-2005 Period**  
**MU: Armstrong Forest**

Forest Unit		Forest Type	Main Working Group	Site Type(s)	Silvicultural System	FRI Parameters and Criteria
Code	Name			(ES = NW ONT. Forested Ecosites)		
	Forest Unit			Site Type(s)	Silvicultural System	FRI Parameters and Criteria
Code	Name	Forest Type	Main Working Group			
SpC	Spruce-Conifer	Conifer	Spruce	ES12, 14, 17, 20, 22, 25, 26, 27, 31, 32, 35	clearcut	WG = Sb or Sw, Po, Bw, <10%
SpM	Spruce-Mixedwood	Conifer	Spruce	ES14, 17, 20, 22, 25, 26, 27, 31, 32	clearcut	WG = Sb or Sw, Po, Bw >10%
SpL	Spruce-Lowland	Conifer	Spruce	ES 31, 34, 36	clearcut	VWG = Sb, Domtar site type = 1
SpR	Spruce-Rugged	Conifer	Spruce			WG = Sb or Sw, Domtar site type = 6
PjC	Jack Pine Conifer	Conifer	Jack Pine	ES12, 14, 26	clearcut	WG = Pj, Po, Bw < 10%
PjM	Jack Pine-Mixedwood	Conifer	Jack Pine	ES14, 20	clearcut	WG = Pj, Po, Bw >10%
PjR	Jack Pine-Rugged	Conifer	Jack Pine			WG = Pj, Domtar site type = 6
BfM	Balsam Fir-Mixedwood	Conifer	Balsam Fir	ES17, 27	clearcut	WG = Bf,
BfR	Balsam Fir-Rugged	Conifer	Balsam Fir			WG = Bf, Domtar site type = 6
OcL	Other Conifer-Lowland	Conifer	Larch, Cedar	ES37	N/A	WG = Ce or La
PoH	Poplar-Hardwood	Hardwood	Poplar	ES19, 23, 28, 29, 33	clearcut	WG = Po
PoR	Poplar-Rugged	Hardwood	Poplar	ES16, 19, 23, 28, 29, 33		WG = Po, Domtar site type = 6
BwM	White Birch-Mixedwood	Hardwood	White Birch	V4 (no ES available)	clearcut	WG = Bw
BwR	White Birch-Rugged	Hardwood	White Birch			WG = Bw, Domtar site type = 6
SPP	Spruce/Pine PFR	Conifer	Spruce or Jack Pine		clearcut	WG = Sb, Sw, Pj, s_type = 25
Oh	Other Hardwood	Hardwood	Balsam Poplar		N/A	WG = Pb

Source: Table FMP-8 Armstrong Forest 2000-2005 FMP

Another refinement that took place on the former spruce forest units was the use of Domtar site type to identify lowland spruce stands. Previously, this forest unit had been identified through the species composition of the stands. However, the digital inventory utilized for the 2000-2005 FMP includes Domtar site types for each stand in the inventory. Domtar's "Spruce Flat" site type that was determined at the time of photo interpretation, and was incorporated into the inventory, provides a better indication of lowland site conditions. Domtar site types were also utilized in the development of the 2000-05 forest units to identify areas of very rough terrain. Domtar site type 6, Rugged Upland, was utilized to identify the SpR, PjR, BfR, PoR, and BwR forest units.

The breakdown of Po1 and Po2 (a mixed and pure poplar forest unit) used in the 1995-2000 TMP was replaced with one poplar forest unit (PoH) in the 2000-05 FMP. The rationale comes from analyzing poplar working groups which had greater than 20% conifer component. This analysis determined that there was so little area which met this criterion, that it would not make sense to try to sustainably manage the Po2 (poplar-mixedwood) forest unit in this FMP.

A new forest unit was created for SPP (spruce and pine dominated PFR). This forest unit is made up of spruce and pine stands growing on very shallow rocky sites that are typed as Production Forest Reserve (PFR) on the 1991 FRI. PFR stands have been identified as a separate forest unit to reflect the different rotation age, successional pathways and silvicultural treatments on these very shallow sites relative to SpC, SpM, PjC and PjM sites.

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Table 2b - Description of Forest Units for the 1995-2000 Period

MU: Armstrong Forest

Forest Unit		Forest	Main Type	Working Group	Site Type(s) (ES = NW ONT. Forested Ecosites)	Silvicultural System	FRI Parameters
Code	Name						& Criteria
Spt	Upland Spruce	All upland spruce working groups not classified as lowland, rugged or PFR	Black Spruce and White Spruce		V15, 18, 19, 20, 24, 25, 30, 31, 32, 33, 34	Clearcut	spruce stands without larch or cedar, which are not pure Sb and are not classified as inoperable or PFR
Sp3	Lowland Spruce and Other Conifer	All lowland spruce working groups	Black Spruce, Larch and Cedar		V22, 23, 34, 35, 36, 37	Clearcut	all stands consisting of pure Sb or Sb with cedar and/or larch
Sp4	Rugged Spruce	Spruce stands growing on very steep slopes	Black Spruce and White Spruce				spruce stands classified as inoperable by photo interpretation
Sp5	Spruce PFR	Spruce stands typed as PFR in the FRI	Black Spruce and White Spruce		V28, 29, 30, 31, 32, 33	Clearcut	spruce stands typed as PFR in the 1976 FRI
Pj 1	Jack Pine	All jack pine stands not classified as rugged or PFR	Jack Pine		V17, 18, 26, 29, 30, 32	Clearcut	All jack pine stands nor classified as rugged or PFR
Pj 4	Rugged Jack Pine	Jack pine stands growing on very steep slopes	Jack Pine				jack pine stands classified as inoperable by photo interpretation
Pj5	Jack Pine PFR	Jack pine stands typed as PFR in the FRI	Jack Pine		V28, 29, 30, 31, 32, 33	Clearcut	jack pine stands typed as PFR in the 1976 FRI
Bf1	Balsam Fir	All balsam fir stands not classified as rugged or PFR	Balsam Fir		V14, 15, 24, 25	Clearcut	All balsam fir stands nor classified as rugged or PFR
Bf 4	Rugged Balsam Fir	Balsam Fir stands growing on very steep slopes	Balsam Fir				balsam fir stands classified as inoperable by photo interpretation
Bf 5	Balsam Fir PFR	Balsam fir stands typed as PFR in the FRI	Balsam Fir		V25	Clearcut	balsam fir stands typed as PFR in the 1976 FRI
Po1	Poplar Mixedwood	Poplar stands that have greater than 25% of conifer	Poplar		V1, 5, 7, 8, 9, 10, 11	Clearcut	Poplar stands that have greater than 25% of spruce and/or jack pine and/or balsam fir
Po 2	Poplar	Poplar stands that have less than 25% of conifer	Poplar		V1, 5	Clearcut	Poplar stands that have less than 25% of spruce and/or jack pine and/or balsam fir
Po 4	Rugged Poplar	Poplar stands growing on very steep slopes	Poplar				Poplar stands classified as inoperable by photo interpretation
Po 5	Poplar PFR	Poplar stands typed as PFR in the FRI	Poplar		V4, 5, 6, 7, 8, 9, 10, 11	Clearcut	Poplar stands typed as PFR in the 1976 FRI
Bw 1	Birch Mixedwood	White Birch stands that have greater than 25% of conifer	White Birch		V4	Clearcut	White Birch stands that have greater than 25% of spruce and/or jack pine and/or balsam fir
Bw 2	Birch	White Birch stands that have less than 25% of conifer	White Birch		V4	Clearcut	White Birch stands that have less than 25% of spruce and/or jack pine and/or balsam fir
Bw 4	Rugged Birch	White Birch stands growing on very steep slopes	White Birch				White Birch stands classified as inoperable by photo interpretation
Bw 5	Birch PFR	White Birch stands typed as PFR in the FRI	White Birch		V4, 5, 6, 7, 8, 9, 10, 11	Clearcut	White Birch stands typed as PFR in the 1976 FRI

Source: Section 4.8.3.1.1 and Table 4.11 of the Armstrong Forest 1995-2000 Timber Management Plan

Based on experiences from the 1995-2000 period, the forest units were further refined for the 2000-05 FMP, presented in Table 2c. In the 1995-2000 plan, there was only one jack pine forest unit and one upland spruce forest unit. These criteria did not differentiate between the pure, mixedwood or rugged stand conditions which often exist on the Forest. With the increased importance of conifer dominated mixedwoods in meeting habitat and ecological requirements, and the increased demand for hardwood from the Forest, it was essential to break out the mixedwood portion of these conifer forest units and track them separately in modeling and harvest allocations. The break point of 10% hardwood component or greater, which is required for the SpM and PjM forest units, was developed based on the observation that once jack pine and spruce working groups have more than a 10% hardwood component they develop along very different ecological pathways than pure stands.

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**Table 2c - Description of Forest Units for the 2000-2005 Period**  
**MU: Armstrong Forest**

Forest Unit		Forest Type	Main Working Group	Site Type(s)	Silvicultural System	FRI Parameters and Criteria
Code	Name			(ES =NW ONT. Forested Ecosites)		
	Forest Unit					
Code	Name	Forest Type	Main Working Group	Site Type(s)	Silvicultural System	FRI Parameters and Criteria
SpC	Spruce-Conifer	Conifer	Spruce	ES12, 14, 17, 20, 22, 25, 26, 27, 31, 32, 35	clearcut	WG = Sb or Sw; Po, Bw, <10%
SpM	Spruce-Mixedwood	Conifer	Spruce	ES14, 17, 20, 22, 25, 26, 27, 31, 32	clearcut	WG = Sb or Sw; Po, Bw >10%
SpL	Spruce-Lowland	Conifer	Spruce	ES 31, 34, 36	clearcut	WG = Sb; Domtar site type = 1
SpR	Spruce-Rugged	Conifer	Spruce			WG = Sb or Sw; Domtar site type = 6
PjC	Jack Pine Conifer	Conifer	Jack Pine	ES12, 14, 26	clearcut	WG = Pj; Po, Bw <= 10%
PjM	Jack Pine-Mixedwood	Conifer	Jack Pine	ES14, 20	clearcut	WG = Pj; Po, Bw >10%
PjR	Jack Pine-Rugged	Conifer	Jack Pine			WG = Pj; Domtar site type = 6
BfM	Balsam Fir-Mixedwood	Conifer	Balsam Fir	ES17, 27	clearcut	WG = Bf;
BfR	Balsam Fir-Rugged	Conifer	Balsam Fir			WG = Bf; Domtar site type = 6
OcL	Other Conifer-Lowland	Conifer	Larch, Cedar	ES37	N/A	WG = Ce or La
PoH	Poplar-Hardwood	Hardwood	Poplar	ES19, 23, 28, 29, 33	clearcut	WG = Po
PoR	Poplar-Rugged	Hardwood	Poplar	ES16, 19, 23, 28, 29, 33		WG = Po; Domtar site type = 6
BwM	White Birch-Mixedwood	Hardwood	White Birch	V4 (no ES available)	clearcut	WG = Bw
BwR	White Birch-Rugged	Hardwood	White Birch			WG = Bw; Domtar site type = 6
SPP	Spruce/Pine PFR	Conifer	Spruce or Jack Pine		clearcut	WG = Sb, Sw; Pj; s_type = 25
Oh	Other Hardwood	Hardwood	Balsam Poplar		N/A	WG = Pb

Source: Table FMP-8 Armstrong Forest 2000-2005 FMP

Another refinement that took place on the former spruce forest units was the use of Domtar site type to identify lowland spruce stands. Previously, this forest unit had been identified through the species composition of the stands. However, the digital inventory utilized for the 2000-2005 FMP includes Domtar site types for each stand in the inventory. Domtar's "Spruce Flat" site type that was determined at the time of photo interpretation, and was incorporated into the inventory, provides a better indication of lowland site conditions. Domtar site types were also utilized in the development of the 2000-05 forest units to identify areas of very rough terrain. Domtar site type 6, Rugged Upland, was utilized to identify the SpR, PjR, BfR, PoR, and BwR forest units.

The breakdown of Po1 and Po2 (a mixed and pure poplar forest unit) used in the 1995-2000 TMP was replaced with one poplar forest unit (PoH) in the 2000-05 FMP. The rationale comes from analyzing poplar working groups which had greater than 20% conifer component. This analysis determined that there was so little area which met this criterion, that it would not make sense to try to sustainably manage the Po2 (poplar-mixedwood) forest unit in this FMP.

A new forest unit was created for SPP (spruce and pine dominated PFR). This forest unit is made up of spruce and pine stands growing on very shallow rocky sites that are typed as Production Forest Reserve (PFR) on the 1991 FRI. PFR stands have been identified as a separate forest unit to reflect the different rotation age, successional pathways and silvicultural treatments on these very shallow sites relative to SpC, SpM, PjC and PjM sites.

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Table 2d - Description of Forest Units for the 2005-2010 Period

MU: Armstrong Forest

Forest Unit		Forest Type	Main Working Group	Site Type(s)	Silvicultural System	FRI Parameters and Criteria	Additional Information
Code	Name						
BfM	Balsam Fir Mixedwood	Conifer	balsam fir	ES21	clearcut	WG = Bf	Balsam fir dominated mixedwood, includes rugged stands (Domtar site type 6).
BwM	White Birch Mixedwood	Hardwood	white birch	ES19	clearcut	WG = Bw	White birch dominated, includes rugged stands (Domtar site type 6).
OcL	Other Conifer Lowland	Conifer	larch, cedar		clearcut	WG = Ce or La	Larch or Cedar dominated lowland
PjC	Jack Pine Conifer	Conifer	jack pine	ES20, 21	clearcut	WG = Pj and Po+Bw<=10%	Jack Pine dominated with hardwood restricted to <= 10%, includes rugged stands (Domtar site type 6).
PjM	Jack Pine Mixedwood	Conifer	jack pine	ES21	clearcut	WG = Pj and Po+Bw>=10%	Jack Pine dominated with hardwood > 10%.
PoH	Poplar Hardwood	Hardwood	poplar	ES19	clearcut	WG = Po	Poplar dominated, includes rugged stands (Domtar site type 6).
SpC	Spruce Conifer	Conifer	spruce	ES20, 21	clearcut	WG = Sb or Sw and Po+Bw<=10%	Spruce dominated with hardwood restricted to <= 10%, includes rugged stands (Domtar site type 6).
SpL	Spruce Lowland	Conifer	spruce	ES36	clearcut	WG = Sb and Domtar site type = 1	Spruce dominated lowland
SpM	Spruce Mixedwood	Spruce dominated w/spruce		ES21	clearcut	WG = Sb or Sw and Po+Bw>=10%	Spruce dominated mixedwood with hardwood > 10%, includes rugged stands (Domtar site type 6).

Source: Table FMP-8 Armstrong Forest 2005-2010 FMP

The forest units developed for the 2000-05 FMP were created to accurately reflect the range of forest ecosystems present on the Armstrong Forest. Based on the use of these forest units through the first part of the 2000-05 plan period, the 2005-10 FMP planning team felt that in general, they were ecologically sound with few changes required. The planning team was faced with the question of continuing to use the set 2000-05 forest units or to change to more closely resemble the MNR Northwest Regional standard forest units. A comparative analysis was undertaken to quantify the correlation between regional standard forest units and Armstrong Forest 2000 FMP forest units. The largest forest units in the 2000-05 FMP, occupying approximately 81% of the landbase (PjC, SpC, PoH, SpL, and BfM) were closely correlated to the regional standard forest units.

It was recognized that on the Armstrong Forest, jack pine, spruce and poplar stands exist in a relatively more pure condition than the regional standard forest unit divisions allow. Therefore, it was decided to maintain the 10% hardwood composition sorting criteria used in the previous plan, rather than the suggested 30% of hardwood allowed in the "pure" regional standard forest units.

The area occupied by the Birch Mixedwood (BwM) forest unit in the 2000-05 FMP would actually be distributed among five separate forest units if the regional standard forest unit criteria were used. The planning team decided that, based on the relatively small area affected (approximately 6% of the Forest), the previous sorting criteria was acceptable.

The 2005-10 FMP planning team recognized that a number of small forest units were created in the 2000-05 FMP, that were essentially not managed, producing a relatively large number of forest units (16). They decided to simplify matters by combining small forest units into some of the other forest units.

These combinations affected the rugged forest units (BfR, BwR, PjR, PoR, and SpR), Spruce-Pine PFR (SPP) and the Other Hardwood (OH) forest units. It was felt that through yield curve work in SFMM, any effects on the Available Harvest Area (AHA) could be controlled by rolling these forest units onto separate, inoperable yield curves within the other, operable forest units.

Based on these combinations, the 16 forest units identified in the 2000-2020 FMP were simplified into 9 forest units for the development of the 2005-10 FMP, as presented in Table 2d. A more detailed discussion of forest unit development, comparisons to the regional standard forest units, and the ArcINFO sorting query can be found in Part One, Section 1.1.3 of the Analysis Package (Appendix A1 of the Armstrong Forest 2005-10 FMP).

### 2.3 Summary of Planned and Actual Harvest Volumes

Trend Analysis Table 3 provides a summary of planned and actual harvest volumes for the past three planning terms, from 1990 to 2005. Only planned harvest volumes are reported for the 2005-10 FMP term as no actual volumes are available for the 2005-10 period at this time.

As footnoted in Table 3, the source of planned harvest volumes for the 1990-95 and 1995-2000 were taken from Tables 4.18.1 from their respective Timber Management Plans. For the 2000-05 period, volumes reported in Table FMP-21 were used, plus planned volumes from Tables FMP-23a included with two salvage amendments (#'s 30 and 31). The actual harvest volumes have been taken from finalized Reports of Past Forest Operations (RPFOs) for the 1990-95 and 1995-2000 FMP terms. With the implementation of the 2004 version of the Forest Management Planning Manual, new reporting procedures and formats came into effect. The 2004-05 annual report contains all volumes harvested over the 2000-05 FMP period, and was used as the source of information for that timeframe. As mentioned in the introduction, due to the significance of the salvage efforts, the planned and actual volumes and areas (which are presented in Trend Analysis Table 4) have been included with regular harvest areas and volumes, in this report.

The bar graph demonstrates that there are some notable discrepancies between planned and actual volumes over the last fifteen years. Wood utilization during the 1990-95 planning period for example, was only 48% of the planned level. Only 2% of the planned hardwood volume was utilized, whereas 53% of the planned softwood volume was utilized. This shortfall was the result of the following main factors:

- The general downturn in the economy drove pulp markets down, resulting in the closure of two Thunder Bay mills that had traditionally utilized pulpwood generated by sawlog operations.
- A severely depressed lumber market for the first two and a half years of the plan reduced the harvest levels.
- A labour dispute at Great West Timber interrupted operations for 2 months in 1990.

The achievement of actual volumes harvested during the 1990-95 term, relative to planned, are higher than the achievement of actual harvest areas versus planned, as outlined in Table 4 (48% versus 37%). This is due primarily to the higher proportion of the Jack Pine 1 (Pj1) forest unit that was harvested, relative to the other forest units. Yields in Pj1 typically exceed the yields in other forest units. Hardwood volume utilization relative to hardwood area depletion was low because the harvesting that did occur in the hardwood forest units occurred in portions of hardwood stands that contained significant proportions of softwood. In addition, hardwood from these areas was often not harvested due to the poor hardwood market conditions of the day. As a result, depletions in hardwood forest units were reported, but primarily softwood volume actually came from these areas.

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**Table 3 - Summary of Planned & Actual Harvest Volumes**

**MU: Armstrong Forest**

**Average Planned Annual Harvest Volumes**

**Volumes are Annualized for the indicated 5 year period**

Species	Volume in cubic metres			
	Past Plans		Current	
	1990-1995 <sup>1</sup>	1995-2000 <sup>2</sup>	2000-2005 <sup>3</sup>	2005-2010 <sup>4</sup>
S	366,739	315,338	265,448	237,827
Pj	115,467	178,417	165,828	98,150
B	14,503	8,996	15,077	18,053
Ce & L				
Po	53,000	62,500	142,251	131,990
Bw	0	44,348	27,743	39,872
<b>Total Planned Volumes</b>	<b>549,710</b>	<b>609,598</b>	<b>616,348</b>	<b>525,893</b>

1. Source: Table 4.18.1 - Armstrong Forest 1990-1995 TMP.

2. Source: Table 4.18.1 - Armstrong Forest 1995-2000 TMP.

3. Source: Table FMP-23 of the Armstrong Forest 2000-2005 FMP, and Table 23a (Salvage Amendments #'s 30 & 31).

4. Source: Table FMP-23 of the Armstrong Forest 2005-2010 FMP.

**Actual Harvest Volumes**

**Volumes are Annualized for the indicated 5 year period**

Species	Volume in cubic metres			
	Past Plans		Current	
	1990-1995 <sup>1</sup>	1995-2000 <sup>2</sup>	2000-2005 <sup>3</sup>	2005-2010 <sup>4</sup>
S	171,163	331,577	192,560	
Pj	81,423	227,997	116,176	
B	9,612	13,713	6,805	
Ce & L		169	1,403	
Po	902	64,262	91,080	
Bw	45	268	3,273	
<b>Total Actual Volumes</b>	<b>263,145</b>	<b>637,987</b>	<b>411,298</b>	<b>N/A</b>

1. Source: Table RPFO-4 - (for the 5-year period from 1990-1995), contained in the Report of Past Forest Operations for the Armstrong Forest 2000-2005 FMP.

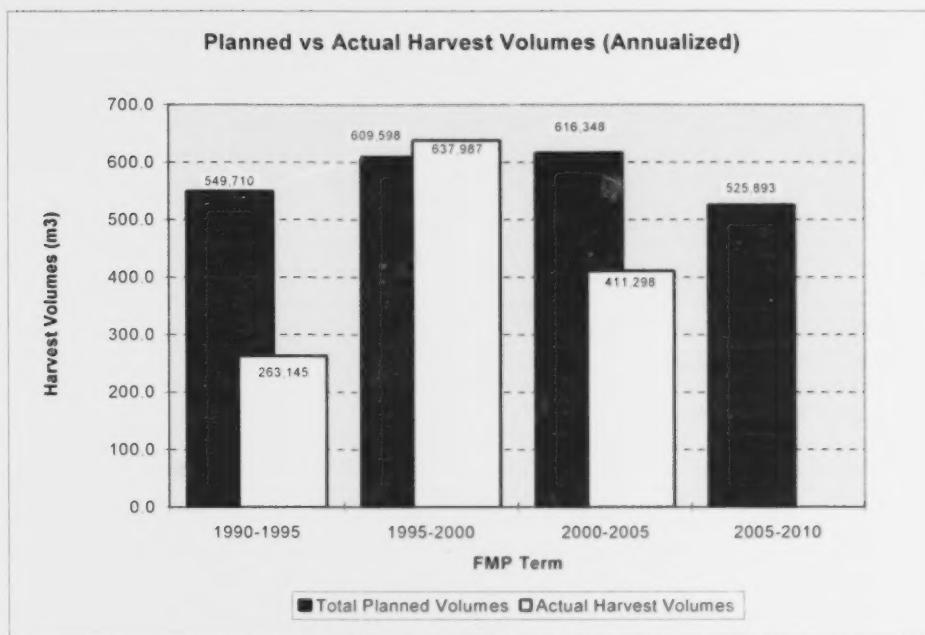
2. Source: Tables RPFO-4 and RPFO-4a (for the 5-year period from 1995-2000), contained in the Report of Past Forest Operations for the Armstrong Forest 2005-2010 FMP.

3. Source: Table AR-4 of the Armstrong Forest 2004-05 Annual Report (Includes salvage volumes).

4. No volumes are available yet for 2005-06 AWS period.

Wood utilization during the 1995-2000 planning period was 105% of the planned level. This overly high level of achievement, compared to the planned versus actual harvest area (76%) discussed in subsequent text, suggests that the yield curves may have been too low for some forest units. This pattern was recognized by the 2000-05 FMP planning team, who adjusted the yield curves upward for that plan. As pointed out in the Report of Past Forest Operations for the period from 1995 to 2000, the data source for the 1995-2000 TMP was somewhat outdated, had very limited cruising in the hardwood stands and limited sample size and not representative of all age classes in the jack pine stands.

Other factors contributing to the over-achievement in volumes were the additional 73,500m<sup>3</sup> realized through salvage harvest efforts (not planned), as well as the high proportion of the conifer forest units that were harvested relative to the hardwood forest units, and in particular jack pine (Pj1).



Note: Planned and actual salvage volumes have been included in this table.

Table 3 reveals that during the 2000-05 FMP term approximately 67% of planned volumes were actually utilized (including regular harvest plus salvage). This shortfall is due primarily to the increase in planned volumes associated with Salvage Amendments # 30 and # 31 (485,978 m<sup>3</sup>). Compared to the original FMP planned volumes identified in Table FMP-23 (2,595,760 m<sup>3</sup>), the total volumes utilized equate to a 79% level of achievement, and compared to planned conifer volumes, an 89% level of achievement. Therefore, it is apparent that actual harvest levels approached planned levels given the harvesting capacity for operations on the Armstrong Forest. The change of focus towards harvesting salvage areas with the associated lower yields (m<sup>3</sup>/ha), particularly during the 2002-03 and 2003-04 AWS periods, resulted in overall lower actual harvest volumes.

A number of other factors that contributed to achieving lower than planned volumes include:

- The lower yields (m<sup>3</sup>/ha) in blowdown salvage operations;
- The limited operation by Whitesand Forestry which utilized only 37% of the volume forecast for them in the 2000-05 FMP. Whitesand Forestry – Woodlands Division experienced a number of challenges during the FMP period.
- A slow-down in conifer requirements during the late winter of 2001 (resulting in a lower than planned utilization of spruce which is often harvested during the winter period);
- The bump-up request that remained outstanding for the majority of the 2000-05 FMP period;
- Buchanan Forest Products Ltd. operating on other Forest Management Units during specific periods during the 2000-05 FMP term;
- Variable weather conditions throughout the 2000-05 FMP term;
- Limited hardwood markets during the 2000-05 FMP period, particularly for white birch, which resulted in limited utilization of white birch (12% of the FMP forecast);
- Some wood harvested during the 2004-05 AWS period could not be hauled until the following winter, and has yet to be reported as utilized.

## 2.4 Summary of Planned and Actual Harvest Area

Trend Analysis Table 4 and the associated chart provide a summary of the annual planned harvest areas during the 1990-2010 period, and the annual actual areas from the 1990 to 2005 period on the Armstrong Forest. Only planned harvest areas are reported for the 2005-10 FMP term as no actual harvest areas are available for the 2005-10 period at this time.

Due to the number of changes in forest unit delineation over this timeframe, as previously described in the text associated with Table 2, the forest units have been slotted into the main working groups for optimum comparative purposes in Table 4.

Similarities are evident between the levels of achievement of actual versus planned harvest area and actual versus planned volumes for the 1990-95 and 2000-05 planning terms (the 1995-2000 term is the exception). During the 1990-95 period only 37% of the planned area was actually harvested, corresponding with the 48% level of achievement in volume forecasts. This shortfall is due to the same reasons as discussed previously (depressed lumber and pulp markets). Harvest depletion levels in the jack pine and balsam forest units were similar, whereas harvest depletion levels in the spruce forest units were considerably lower. The low depletion levels in the spruce forest unit are primarily the result of the closure of the two Thunder Bay mills that traditionally utilized pulpwood generated by sawlog operation. Depletion levels in the hardwood forest units were 49% of the 1990-95 forecasted target. This shortfall was the result of Domtar not being able to utilize their allocated hardwood, and the fact that hardwood markets for other hardwood users developed at a slower rate than expected.

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Table 4 - Summary of Planned and Actual Depletion Area

MU: Armstrong Forest

Plan Term	Planned Annual Harvest Area				Actual Depletion Area					
	Area in hectares				Area in hectares					
	Past Plans		Current		Past Plans		Current		Past Plans	
Forest Unit	1990-1995 <sup>1</sup>	1995-2000 <sup>2</sup>	2000-2005 <sup>3</sup>	2005-2010 <sup>4</sup>	1990-1995 <sup>5</sup>	1995-2000 <sup>6</sup>	2000-2005 <sup>7</sup>	2005-2010 <sup>8</sup>	Harvest	Natural
Spruce	3,318	2,699	2,175	2,216	862	366	2,322	1,952	1,713	1,317
Jack Pine	1,332	2,117	1,176	600	741	8	1,777	792	995	284
Balsam Fir	35	99	221	327	32	24	73	21	219	81
Spruce Pine PFR			3						3	
Other Conifer			4						1	4
Poplar	484	1,338	900	880	237	8	843	315	649	24
White Birch		446	161	225			229	88	69	10
B&S					2	1	18	20		
PF					16	1	12	54		
Other							0		16	8
Total Area	5,170	6,699	4,641	4,247	1,891	406	5,274	3,241	3,664	1,728
										N/A

1. Source: Table 4.16 ("Total Planned Harvest") Armstrong Forest 1990-1995 TMP

2. Source: Table 4.16a (Conifer and Hardwood Scenario - "Total Planned Harvest") Armstrong Forest 1995-2000 TMP.

3. Source: Table FMP-18 of the Armstrong Forest 2000-2005 FMP and Table FMP 22a of Amendments # 30 & # 31.

4. Source: Table FMP-18 of the Armstrong Forest 2005-2010 FMP.

5. Source: Table RPFO-1 (for the 5-year period from 1990-1995), contained in the Report of Past Forest Operations for the Armstrong Forest 2000-2005 FMP.

6. Source: Table RPFO-1 (for the 5-year period from 1995-2000), contained in the Report of Past Forest Operations for the Armstrong Forest 2005-2010 FMP.

7. Source: Table AR-1 in the 2004-2005 Annual Report for the Armstrong Forest, plus the areas reported in the ("Salvage" column) in Annual Reports, for the four years 2001-2001 to 2004-2005.

8. No harvest depletions are available for the 2005-2010 period at this time.

**Note:** Individual forest units were rolled up into broader WGs to fit the format of this table.

As mentioned in the previous section, the actual harvest area for the 1995-2000 FMP period was 76% of the planned harvest area, and 79% when salvage areas are included (as they are in Table 4). Actual harvest areas for the softwood forest units were 82% of planned harvest areas, whereas actual harvest areas for hardwood forest units was 59%.

Contributing factors during this period include:

- Low depletion levels in the first two years of the 1995-2000 plan period resulted in large harvest areas during the final three years of the plan term (80% of the allocations), affecting the availability of machinery to harvest all conifer allocations. The machinery available to harvest these allocations could not complete the increased harvest during this relatively short time period.
- Mild weather and record snowfalls in 1996-1997 resulted in winter harvest operations being "squeezed" into the three subsequent winters. Early spring conditions in 1999-2000 resulted in the early curtailment of winter harvest operations, contributing to the reduction in harvest area.
- A planned operating area at Ombabika Bay, partially within the Lake Nipigon Conservation Reserve became partially unavailable for harvest with implementation of the OLL strategy.
- Significant road construction was required to access allocations east of the Jackfish River.
- There was a lack of poplar markets during the first two years of the 1995-2000 TMP period until Buchanan Northern Hardwoods Ltd. mill came on line in 1997, with the result that poplar began to be utilized from the Armstrong Forest.
- Most of the white birch allocations were not accessible until late in the planning period, affecting planned depletions. There were also quality and marketability issues with birch.
- A total of 5,977 hectares of bypass were reported for the 1995-2000 TMP term. Areas were bypassed for a number of reasons, including inoperability, inaccessibility, and lack of markets.

The planned harvest areas for the 2000-05 FMP (reported in Table FMP-18) have been updated to include areas associated with two minor (Salvage)amendments (Coded Amendment # 30 and # 31), which added 5,535 hectares of planned salvage harvest area. There were numerous administrative amendments over the 2000-05 period, but involved negligible area that has not been reflected in updated FMP tables.

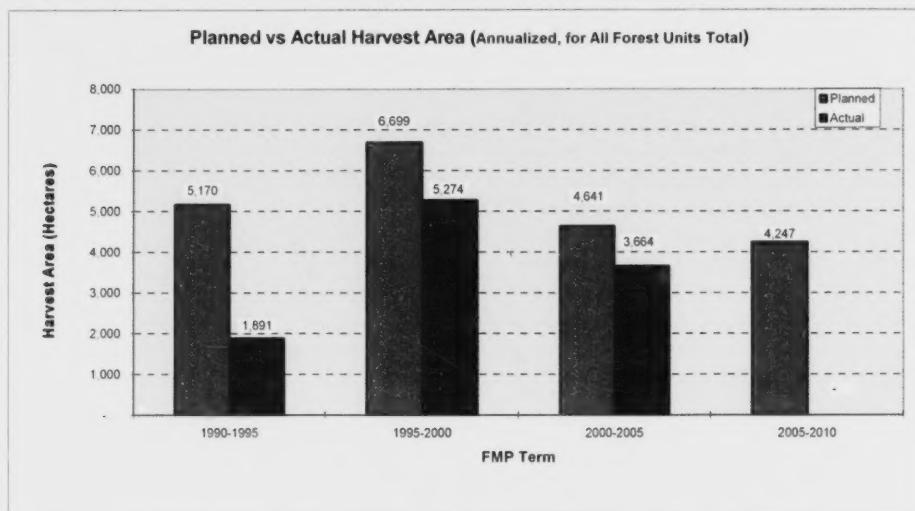
The annualized actual harvest area (3,664 hectares) equates to 79% of the planned areas. Conifer forest unit depletion levels for the 2000-05 FMP period were 82% of the FMP forecast, while hardwood depletion levels were 68%. It should be recognized that harvesting in the salvage harvest amendment areas accounted for approximately 22% of the total harvesting on the Armstrong Forest during the 2000-05 FMP period. With salvage harvesting, the total area harvested was above the original FMP forecast (104%). With the salvage harvesting factored in, it is apparent that actual harvest levels actually approached planned levels given the harvesting capacity for operations on the Armstrong Forest.

Contributing factors to the planned harvest area shortfall include:

- The bump-up request that remained outstanding for the majority of the 2000-05 FMP period, resulting in the unavailability of operating blocks 200, 201, and 202.
- Buchanan Forest Products Ltd. operated on other SFLs during specific periods during the term, affecting machine availability.
- Variable weather conditions affected the ability of operations to harvest certain areas at critical times, which in turn affected machine availability.
- A poor economic atmosphere existed throughout the FMP period resulting from a number of factors (the softwood lumber dispute, increased fuel costs, increased insurance costs, and depressed selling prices for products).
- Poor market conditions during the winter of 2001 resulted in a temporary shut-down of the Buchanan Forest Products Ltd. operation for several months.
- There were limited hardwood markets during the 2000-05 FMP period, particularly for white birch, which resulted in lower depletions in the BwM forest.
- Whitesand Forestry harvested only 55% of the allocations available to them in the 2000-05 FMP. Whitesand Forestry – Woodlands Division experienced a number of challenges during the FMP period, including changes in management, changes in business structure, and the development of new business arrangements.

In general, as shown in the bar graph below, a positive trend is evident in that the gap between the actual and planned harvest areas has become progressively smaller over the three previous planning terms. It

should also be acknowledged that there are areas depleted as "bypass" that are a normal reality in harvest operations. These areas have not been included as part of the actual harvest areas, but are inherently included as planned harvest areas. In other words, as long as bypass areas exist within allocations, a 100% level of achievement can never be attained.



## 2.5 Summary of Managed Productive Forest By Forest Unit

Trend Analysis Tables 5a-d, covering the 15-year period from 1990 to 2005, provide a summary of Crown Managed productive forest, by forest unit and age class. Productive forest is composed of Protection Forest (PF) plus Production Forest. Productive forest also includes Barren and Scattered or NSR (Not Sufficiently Regenerated) land. The sources of information for these areas are Tables TMP-4.8.2 and TMP-4.9 for the 1990-95 and 1995-2000 periods, and Table FMP-9 for the 2000-05 and 2005-10 planning periods.

An age class breakdown was not available for the PF areas in the 1990-95 and 1995-2000 TMPs. The 2000-05 FMP (Table 5c), was the first planning period where volumes associated with available forest and protection forest can be provided on an age class basis. This information was not summarized in previous plans.

The "Unavailable" Crown Managed Production Forest in Table 5 is intended to reflect the areas reserved from harvest, to protect known and identified (existing) values such as moose aquatic feeding areas, water quality, tourism lakes, etc. In strategic modeling (SFMM), there are two types of reserves, "existing" and "accumulating". Up until and including the preparation of the 2000-05 FMP (the first plan where SFMM was used), Area of Concern (AOC) reserves that were prescribed in previous TMPs (existing reserves) did not reside in the planning inventory and therefore could not be summarized in the previous tables. Reference was made in Section 2.1 of this report, to the inclusion of the caribou calving reserves in the Crown Managed portion of the forest for the 2005-10 FMP (Calving Reserves were designated as Crown Unmanaged in the 2000-05 FMP). This area has been recorded as "Unavailable" in Table 5d.

The purpose of this summary is to address forest condition over time, and significant changes in forest unit area (conversions) or major age class shifts, resulting from forest management activities. The changes in area occupied by each forest unit on the Armstrong Forest over three planning periods are not the result of conversions due to silvicultural or forest management activities. Rather they are predominately the result of using differing forest unit criteria, different Forest Resource Inventories (1976 and 1991 FRI), or a reflection of land withdrawals and corrections to the planning inventory.

Tables 5a and 5b show that there was actually very little difference in the Crown managed productive forest area between 1990 and 1995 for either protection forest (PF) or available productive forest area (with losses of only 0.6% and 1.7% respectively). These minor changes were due to FRI updating and classification of PF area. Significant differences in productive forest area are first evident in Table 5c, due to the landbase reductions associated with the expansion of Wabakimi Provincial Park and the implementation of the Ontario Living Legacy (OLL) Land Use Strategy (as discussed previously, in Section 2.1).

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**Table 5a - Summary of Managed Productive Forest By Forest Unit (1990-1995)**

**MU: Armstrong Forest**

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
Spruce	B&S / NSR					23,395	
	FTG- 20					7,732	
	21 - 40					9,324	
	41 - 60					42,191	
	61 - 80					67,318	
	81 - 100					42,354	
	101-120					33,054	
	121+					88,228	
Forest Unit Subtotal		21,763	N/A	N/A	N/A	313,596	N/A
Pine	B&S / NSR					14,930	
	FTG- 20					875	
	21 - 40					8,589	
	41 - 60					38,039	
	61 - 80					49,086	
	81 - 100					12,004	
	101-120					1,457	
	121+					1,183	
Forest Unit Subtotal		681	N/A	N/A	N/A	126,163	N/A
Balsam Fir	B&S / NSR					959	
	FTG- 20					128	
	21 - 40					1,304	
	41 - 60					3,170	
	61 - 80					2,452	
	81 - 100					1,334	
	101-120					252	
	121+					96	
Forest Unit Subtotal		27	N/A	N/A	N/A	9,695	N/A
Other Conifer	B&S / NSR						
	FTG- 20						
	21 - 40					3	
	41 - 60					19	
	61 - 80					52	
	81 - 100					58	
	101-120					70	
	121+					260	
Forest Unit Subtotal		1,397	N/A	N/A	N/A	462	N/A
Poplar	B&S / NSR					2,817	
	FTG- 20					205	
	21 - 40					3,209	
	41 - 60					26,969	
	61 - 80					52,638	
	81 - 100					15,004	
	101-120					3,081	
	121+					1,081	
Forest Unit Subtotal		349	N/A	N/A	N/A	105,004	N/A
Birch	B&S / NSR					5,023	
	FTG- 20					474	
	21 - 40					9,596	
	41 - 60					24,411	
	61 - 80					14,869	
	81 - 100					10,958	
	101-120					3,893	
	121+					5,255	
Forest Unit Subtotal		1,319	N/A	N/A	N/A	74,479	N/A
All Forest Units	B&S / NSR					47,124	
	FTG- 20					9,414	
	21 - 40					32,025	
	41 - 60					134,799	
	61 - 80					186,415	
	81 - 100					81,712	
	101-120					41,807	
	121+					96,103	
TOTAL		25,536	N/A	N/A	N/A	629,399	N/A

Source: Tables 4.8.2 and 4.9 from the Armstrong Forest 1990-1995 TMPs.

Note: Volumes by age class and forest unit are not available for this planning period.

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**Table 5b - Summary of Managed Productive Forest By Forest Unit (1995-2000)**

**MU: Armstrong Forest**

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
Spruce 1	B&S / NSR 2-6					11,839	
	FTG- 20					7,256	
	21 - 40					850	
	41 - 60					18,675	
	61 - 80					58,506	
	81 -100					33,849	
	101-120					17,493	
	121+					29,370	
	Forest Unit Subtotal	829	N/A	N/A	N/A	177,838	N/A
Spruce 3	B&S / NSR 2-6					3,012	
	FTG- 20					1,844	
	21 - 40					514	
	41 - 60					6,534	
	61 - 80					12,638	
	81 -100					11,385	
	101-120					11,581	
	121+					71,427	
	Forest Unit Subtotal	22,303	N/A	N/A	N/A	118,935	N/A
Spruce 4	B&S / NSR 2-6					24	
	FTG- 20					0	
	21 - 40					0	
	41 - 60					346	
	61 - 80					560	
	81 -100					521	
	101-120					479	
	121+					1,822	
	Forest Unit Subtotal	4	N/A	N/A	N/A	3,752	N/A
Spruce 5 (PFR)	B&S / NSR 2-6					73	
	FTG- 20					0	
	21 - 40					0	
	41 - 60					1,158	
	61 - 80					2,667	
	81 -100					1,500	
	101-120					555	
	121+					779	
	Forest Unit Subtotal	0	N/A	N/A	N/A	6,732	N/A
Jack Pine 1	B&S / NSR 2-6					4,729	
	FTG- 20					6,532	
	21 - 40					448	
	41 - 60					25,670	
	61 - 80					58,901	
	81 -100					17,387	
	101-120					2,756	
	121+					2,170	
	Forest Unit Subtotal	593	N/A	N/A	N/A	118,593	N/A
Jack Pine 4	B&S / NSR 2-6					16	
	FTG- 20					0	
	21 - 40					19	
	41 - 60					107	
	61 - 80					450	
	81 -100					549	
	101-120					150	
	121+					98	
	Forest Unit Subtotal	24	N/A	N/A	N/A	1,389	N/A
Jack Pine 5 (PFR)	B&S / NSR 2-6					178	
	FTG- 20					0	
	21 - 40					91	
	41 - 60					1,555	
	61 - 80					2,352	
	81 -100					121	
	101-120					29	
	121+					7	
	Forest Unit Subtotal	0	N/A	N/A	N/A	4,333	N/A

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**Table 5b - Summary of Managed Productive Forest By Forest Unit (1995-2000)**

**MU: Armstrong Forest**

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
Spruce 1	B&S / NSR 2-6					11,839	
	FTG- 20					7,256	
	21 - 40					850	
	41 - 60					18,675	
	61 - 80					58,506	
	81 -100					33,849	
	101-120					17,493	
	121+					29,370	
	Forest Unit Subtotal	829	N/A	N/A	N/A	177,538	N/A
Spruce 3	B&S / NSR 2-6					3,012	
	FTG- 20					1,844	
	21 - 40					514	
	41 - 60					6,534	
	61 - 80					12,638	
	81 -100					11,385	
	101-120					11,581	
	121+					71,427	
	Forest Unit Subtotal	22,303	N/A	N/A	N/A	118,935	N/A
Spruce 4	B&S / NSR 2-6					24	
	FTG- 20					0	
	21 - 40					0	
	41 - 60					346	
	61 - 80					560	
	81 -100					521	
	101-120					479	
	121+					1,822	
	Forest Unit Subtotal	4	N/A	N/A	N/A	3,752	N/A
Spruce 5 (PFR)	B&S / NSR 2-6					73	
	FTG- 20					0	
	21 - 40					0	
	41 - 60					1,158	
	61 - 80					2,667	
	81 -100					1,500	
	101-120					555	
	121+					779	
	Forest Unit Subtotal	0	N/A	N/A	N/A	6,732	N/A
Jack Pine 1	B&S / NSR 2-6					4,729	
	FTG- 20					6,532	
	21 - 40					448	
	41 - 60					25,670	
	61 - 80					58,901	
	81 -100					17,387	
	101-120					2,756	
	121+					2,170	
	Forest Unit Subtotal	593	N/A	N/A	N/A	118,593	N/A
Jack Pine 4	B&S / NSR 2-6					16	
	FTG- 20					0	
	21 - 40					19	
	41 - 60					107	
	61 - 80					450	
	81 -100					549	
	101-120					150	
	121+					98	
	Forest Unit Subtotal	24	N/A	N/A	N/A	1,389	N/A
Jack Pine 5 (PFR)	B&S / NSR 2-6					178	
	FTG- 20					0	
	21 - 40					91	
	41 - 60					1,555	
	61 - 80					2,352	
	81 -100					121	
	101-120					29	
	121+					7	
	Forest Unit Subtotal	0	N/A	N/A	N/A	4,333	N/A

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Balsam Fir 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					531 0 195 2,918 2,634 2,196 296 150
	Forest Unit Subtotal	27	N/A	N/A	N/A	8,920 N/A
Balsam Fir 4	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					0 0 0 114 49 79 29 2
	Forest Unit Subtotal	0	N/A	N/A	N/A	273 N/A
Balsam Fir 5 (PFR)	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					2 0 0 42 28 30 0 0
	Forest Unit Subtotal	0	N/A	N/A	N/A	102 N/A
Poplar 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					0 1,082 341 3,247 23,489 5,948 1,981 1,127
	Forest Unit Subtotal	157	N/A	N/A	N/A	37,215 N/A
Poplar 2	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					0 891 0 6,106 38,996 13,495 2,586 383
	Forest Unit Subtotal	137	N/A	N/A	N/A	62,457 N/A
Poplar 4	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					0 2 0 134 1,133 522 184 29
	Forest Unit Subtotal	0	N/A	N/A	N/A	2,004 N/A
Poplar 5	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					0 21 8 361 2,400 139 30 35
	Forest Unit Subtotal	0	N/A	N/A	N/A	2,994 N/A
Birch 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81-100 101-120 121+					2,481 0 833 15,225 6,660 6,692 2,904 5,438
	Forest Unit Subtotal	548	N/A	N/A	N/A	40,233 N/A

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Birch 2	B&S / NSR 2-6					708	
	FTG- 20					0	
	21 - 40					273	
	41 - 60					5,440	
	61 - 80					4,056	
	81 -100					3,028	
	101-120					786	
	121+					588	
Forest Unit Subtotal		236	N/A	N/A	N/A	14,879	N/A
Birch 4	B&S / NSR 2-6					31	
	FTG- 20					0	
	21 - 40					227	
	41 - 60					5,636	
	61 - 80					1,660	
	81 -100					3,431	
	101-120					827	
	121+					528	
Forest Unit Subtotal		434	N/A	N/A	N/A	12,340	N/A
Birch 5	B&S / NSR 2-6					65	
	FTG- 20					0	
	21 - 40					21	
	41 - 60					1,663	
	61 - 80					2,141	
	81 -100					925	
	101-120					50	
	121+					339	
Forest Unit Subtotal		0	N/A	N/A	N/A	5,204	N/A
All Forest Units	B&S / NSR 2-6					23,689	
	FTG- 20					17,628	
	21 - 40					3,820	
	41 - 60					94,931	
	61 - 80					219,320	
	81 -100					101,797	
	101-120					42,716	
	121+					114,292	
TOTAL		25,392	N/A	N/A	N/A	618,193	N/A

Source: Tables 4.8.2 and 4.9 from the Armstrong Forest 1995-2000 TMP

Note: Volumes by age class and forest unit are not available for this planning period

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**Table 5c - Summary of Managed Productive Forest By Forest Unit (2000-2005)**

**MU: Armstrong Forest**

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
SpC	FTG- 20					16,739	
	21 - 40					151	5,076
	41 - 60	26	2,860			6,749	730,294
	61 - 80	68	9,032			37,315	5,127,023
	81 -100	68	11,067			16,037	2,605,589
	101-120	14	2,380			3,475	575,178
	121-140	5	556			1,301	194,141
	141-160					1,247	158,172
	161-180					47	3,808
Forest Unit Subtotal		180	25,895			83,060	9,399,281
SpM	FTG- 20					1,749	14,766
	21 - 40					15	660
	41 - 60	1	101			3,309	329,565
	61 - 80	16	2,208			13,717	1,754,506
	81 -100					4,174	618,365
	101-120					1,050	158,552
	121-140					242	26,989
	141-160					27	2,075
	161-180					24	1,656
Forest Unit Subtotal		17	2,309			24,307	2,907,134

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Balsam Fir 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					531 0 195 2,918 2,634 2,196 296 150
	Forest Unit Subtotal	27	N/A	N/A	N/A	8,920 N/A
Balsam Fir 4	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					0 0 0 114 49 79 29 2
	Forest Unit Subtotal	0	N/A	N/A	N/A	273 N/A
Balsam Fir 5 (PFR)	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					2 0 0 42 28 30 0 0
	Forest Unit Subtotal	0	N/A	N/A	N/A	102 N/A
Poplar 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					0 1,082 341 3,247 23,489 5,948 1,981 1,127
	Forest Unit Subtotal	157	N/A	N/A	N/A	37,215 N/A
Poplar 2	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					0 891 0 6,106 38,996 13,495 2,586 383
	Forest Unit Subtotal	137	N/A	N/A	N/A	62,457 N/A
Poplar 4	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					0 2 0 134 1,133 522 184 29
	Forest Unit Subtotal	0	N/A	N/A	N/A	2,004 N/A
Poplar 5	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					0 21 8 361 2,400 139 30 35
	Forest Unit Subtotal	0	N/A	N/A	N/A	2,994 N/A
Birch 1	B&S / NSR 2-6 FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121+					2,481 0 833 15,225 6,660 6,692 2,904 5,438
	Forest Unit Subtotal	648	N/A	N/A	N/A	40,233 N/A

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Birch 2	B&S / NSR 2-6					708	
	FTG- 20					0	
	21 - 40					273	
	41 - 60					5,440	
	61 - 80					4,056	
	81 -100					3,028	
	101-120					786	
	121+					588	
	<b>Forest Unit Subtotal</b>	<b>236</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>14,879</b>	<b>N/A</b>
Birch 4	B&S / NSR 2-6					31	
	FTG- 20					0	
	21 - 40					227	
	41 - 60					5,636	
	61 - 80					1,660	
	81 -100					3,431	
	101-120					827	
	121+					528	
	<b>Forest Unit Subtotal</b>	<b>434</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>12,340</b>	<b>N/A</b>
Birch 5	B&S / NSR 2-6					65	
	FTG- 20					0	
	21 - 40					21	
	41 - 60					1,663	
	61 - 80					2,141	
	81 -100					925	
	101-120					50	
	121+					339	
	<b>Forest Unit Subtotal</b>	<b>0</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>5,204</b>	<b>N/A</b>
All Forest Units	B&S / NSR 2-6					23,689	
	FTG- 20					17,628	
	21 - 40					3,820	
	41 - 60					94,931	
	61 - 80					219,320	
	81 -100					101,797	
	101-120					42,716	
	121+					114,292	
	<b>TOTAL</b>	<b>25,392</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>618,193</b>	<b>N/A</b>

Source: Tables 4.8.2 and 4.9 from the Armstrong Forest 1995-2000 TMP.

Note: Volumes by age class and forest unit are not available for this planning period.

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#### Table 5c - Summary of Managed Productive Forest By Forest Unit (2000-2005)

MU: Armstrong Forest

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
SpC	FTG- 20					16,739	
	21 - 40					151	5,076
	41 - 60	26	2,860			6,749	730,294
	61 - 80	68	9,032			37,315	5,127,023
	81 -100	68	11,067			16,037	2,605,589
	101-120	14	2,380			3,475	575,178
	121-140	5	556			1,301	194,141
	141-160					1,247	158,172
	161-180					47	3,808
	<b>Forest Unit Subtotal</b>	<b>180</b>	<b>25,895</b>			<b>83,060</b>	<b>9,399,281</b>
SpM	FTG- 20					1,749	14,766
	21 - 40					15	660
	41 - 60	1	101			3,309	329,565
	61 - 80	16	2,208			13,717	1,754,506
	81 -100					4,174	618,365
	101-120					1,050	158,552
	121-140					242	26,969
	141-160					27	2,075
	161-180					24	1,656
	<b>Forest Unit Subtotal</b>	<b>17</b>	<b>2,309</b>			<b>24,307</b>	<b>2,907,134</b>

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SPL	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160 161-180 181-200					14,130 27 1,786 10,728 6,386 6,440 7,141 24,088 48 58	14 11,965 832,691 816,412 891,685 928,618 2,797,406 4,944 5,059
	Forest Unit Subtotal	4,210	453,203			70,832	6,288,794
SpR	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160					71 27 408 161 49	2,688 49,164 23,724 6,675
	Forest Unit Subtotal					715	82,251
PjC	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160	51				28,873 585 1,895 27,169 7,199 814 99	11,743 195,983 4,062,252 1,406,780 158,443 13,563
	Forest Unit Subtotal	519	65,192			66,635	5,848,764
PjM	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160					4,967 120 405 5,755 1,497 289 30	2,895 960 46,284 895,980 290,906 58,699 3,510
	Forest Unit Subtotal	64	10,708			13,063	1,299,234
PjR	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160	17	51			118 56 17	
	Forest Unit Subtotal	187	11,620			191	7,444
BfM	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160					1,446 157 8,652 2,301 132 111	56,316 6,123 841,128 276,884 21,308 18,810
	Forest Unit Subtotal	28	3,098			12,798	1,220,569
BfR	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160					37 807 43	80,784 5,461
	Forest Unit Subtotal					887	86,245
OcL	FTG- 20 21 - 40 41 - 60 61 - 80 81 -100 101-120 121-140 141-160					1 9 39 14 37 37	
	Forest Unit Subtotal	94	1,293			137	1,704

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PoH	FTG- 20	34			8,177	
	21 - 40				55	1,540
	41 - 60	58	4,560		3,466	271,816
	61 - 80	1,332	100,788		36,527	3,487,805
	81 -100	453	65,457		18,262	2,217,990
	101-120		16	1,848	1,916	221,304
	121-140				22	1,364
	141-160					
Forest Unit Subtotal		1,893	172,653		68,424	6,201,819
PoR	FTG- 20				12	
	21 - 40					
	41 - 60	103				
	61 - 80	948			261	
	81 -100	102			64	
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		1,153			337	0
BwM	FTG- 20				2,844	
	21 - 40				23	391
	41 - 60	162	6,934		7,077	301,223
	61 - 80	167	9,976		8,863	550,386
	81 -100	40	3,400		1,720	150,588
	101-120				611	56,060
	121-140				169	12,600
	141-160				62	2,232
Forest Unit Subtotal		369	20,310		21,369	1,073,492
BwR	FTG- 20				169	
	21 - 40					
	41 - 60	769	25,377		195	5,467
	61 - 80	770	32,876		132	5,453
	81 -100	71	3,905			
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		1,610	62,158		496	10,920
SPP	FTG- 20					
	21 - 40					
	41 - 60				153	8,470
	61 - 80				822	74,032
	81 -100				288	31,392
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal					1,264	113,894
CHI	FTG- 20					
	21 - 40					
	41 - 60					
	61 - 80		70			
	81 -100					
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		70			31	25,225
All Forest Units Total	FTG- 20	85			79,332	73,977
	21 - 40	17	51		1,133	26,507
	41 - 60	1,453	56,854		34,530	2,825,667
	61 - 80	4,858	285,306		144,073	17,146,874
	81 -100	1,185	146,431		56,014	8,190,236
	101-120	787	105,359		14,769	2,145,616
	121-140	627	79,164		9,058	1,182,088
	141-160	1,381	155,274		25,460	2,960,338
	161-180				119	10,408
	181-200				58	5,059
	201+					
Grand Total		10,393	828,439		364,546	34,566,770

Source: Table FMP-9 from the Armstrong Forest 2000-2005 FMP

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SpL	FTG- 20					14,130	
	21 - 40					27	14
	41 - 60	139	980			1,786	11,985
	61 - 80	1,034	71,895			10,728	832,691
	81 - 100	369	46,608			6,386	816,412
	101-120	725	100,636			6,440	891,685
	121-140	590	78,160			7,141	928,518
	141-160	1,352	154,924			24,088	2,797,408
	161-180					48	4,944
	181-200					58	5,059
Forest Unit Subtotal		4,210	453,203			70,832	6,288,794
SpR	FTG- 20					71	
	21 - 40					27	2,688
	41 - 60					408	49,164
	61 - 80					161	23,724
	81 - 100					49	6,675
	101-120						
	121-140						
	141-160						
	Forest Unit Subtotal					715	82,251
	Forest Unit Subtotal						
PjC	FTG- 20	51				28,873	
	21 - 40					585	11,743
	41 - 60	89	8,192			1,895	195,983
	61 - 80	344	49,878			27,169	4,062,252
	81 - 100	35	7,122			7,199	1,406,780
	101-120					814	158,443
	121-140					99	13,563
	141-160						
	Forest Unit Subtotal		519	65,192		66,635	5,848,764
	Forest Unit Subtotal						
PjM	FTG- 20					4,967	
	21 - 40					120	960
	41 - 60	21	2,280			405	46,284
	61 - 80					5,755	895,980
	81 - 100	43	8,428			1,497	290,906
	101-120					289	58,699
	121-140					30	3,510
	141-160						
	Forest Unit Subtotal		64	10,708		13,063	1,299,234
	Forest Unit Subtotal						
PjR	FTG- 20					118	
	21 - 40	17	51				
	41 - 60	67	3,752				
	61 - 80	100	7,373			56	6,645
	81 - 100	4	444				
	101-120					17	799
	121-140						
	141-160						
	Forest Unit Subtotal		187	11,620		191	7,444
	Forest Unit Subtotal						
BfM	FTG- 20					1,446	
	21 - 40					157	6,123
	41 - 60	18	1,818			8,652	841,128
	61 - 80	10	1,280			2,301	276,884
	81 - 100					132	21,308
	101-120					111	18,810
	121-140						
	141-160						
	Forest Unit Subtotal		28	3,098		12,796	1,220,569
	Forest Unit Subtotal						
BfR	FTG- 20					37	
	21 - 40						
	41 - 60					807	80,784
	61 - 80					43	5,461
	81 - 100						
	101-120						
	121-140						
	141-160						
	Forest Unit Subtotal					887	86,245
	Forest Unit Subtotal						
OcL	FTG- 20					1	
	21 - 40					9	
	41 - 60						
	61 - 80					39	537
	81 - 100					14	210
	101-120	33	495			37	504
	121-140	32	448			37	453
	141-160	29	350				
	Forest Unit Subtotal		94	1,293		137	1,704
	Forest Unit Subtotal						

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PoH	FTG- 20	34			8,177	
	21 - 40				55	1,540
	41 - 60	58	4,560		3,486	271,816
	61 - 80	1,332	100,788		36,527	3,487,805
	81 -100	453	65,457		18,262	2,217,990
	101-120	16	1,848		1,916	221,304
	121-140				22	1,364
	141-160					
Forest Unit Subtotal		1,893	172,653		68,424	6,201,819
PoR	FTG- 20				12	
	21 - 40					
	41 - 60	103				
	61 - 80	948			261	
	81 -100	102			64	
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		1,153			337	0
BwM	FTG- 20				2,844	
	21 - 40				23	391
	41 - 60	162	6,934		7,077	301,223
	61 - 80	167	9,976		8,863	550,398
	81 -100	40	3,400		1,720	150,588
	101-120				611	56,060
	121-140				169	12,600
	141-160				62	2,232
Forest Unit Subtotal		369	20,310		21,369	1,073,492
BwR	FTG- 20				169	
	21 - 40					
	41 - 60	769	25,377		195	5,467
	61 - 80	770	32,876		132	5,453
	81 -100	71	3,905			
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		1,610	62,158		496	10,920
SPP	FTG- 20					
	21 - 40					
	41 - 60				153	8,470
	61 - 80				822	74,032
	81 -100				288	31,392
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal					1,264	113,894
Oh	FTG- 20					
	21 - 40					
	41 - 60					
	61 - 80	70			31	25,225
	81 -100					
	101-120					
	121-140					
	141-160					
Forest Unit Subtotal		70			31	25,225
All Forest Units Total	FTG- 20	85	51		79,332	73,977
	21 - 40	17			1,133	26,507
	41 - 60	1,453	56,854		34,530	2,825,667
	61 - 80	4,858	285,306		144,073	17,146,874
	81 -100	1,185	146,431		56,014	8,190,238
	101-120	787	105,359		14,769	2,145,616
	121-140	627	79,164		9,058	1,182,088
	141-160	1,381	155,274		25,460	2,980,338
	161-180				119	10,408
	181-200				58	5,059
Grand Total		10,393	828,439		364,546	34,566,770

Source: Table FMP-9 from the Armstrong Forest 2000-2005 FMP.

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Table 5d - Summary of Managed Productive Forest By Forest Unit (2005-2010)

MU: Armstrong Forest

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
BfM	FTG- 20	0	0	0	0	641	0
	21 - 40	0	0	0	0	0	0
	41 - 60	0	0	4	410	4,499	448,471
	61 - 80	10	1,260	18	2,094	4,856	556,481
	81 - 100	0	0	17	2,321	157	21,862
	101-120	0	0	45	6,390	102	13,653
	121-140	0	0	0	0	0	0
	141-160	0	0	21	1,050	0	0
	161-180						
	181-200						
201+							
Forest Unit Subtotal		10	1,260	105	12,265	10,255	1,040,467
BwM	FTG- 20	0	0	3	0	1,947	0
	21 - 40	0	0	13	0	181	0
	41 - 60	420	23,400	22	1,232	3,913	212,105
	61 - 80	1,341	89,531	296	19,899	12,570	853,037
	81 - 100	112	10,486	158	14,627	1,742	161,039
	101-120	0	0	0	0	612	58,708
	121-140	0	0	0	0	441	30,694
	141-160	0	0	0	0	40	1,080
	161-180						
	181-200						
201+							
Forest Unit Subtotal		1,873	123,417	492	35,758	21,445	1,316,563
OcL	FTG- 20	0	0	0	0	26	0
	21 - 40	0	0	0	0	0	0
	41 - 60	0	0	0	0	9	63
	61 - 80	0	0	0	0	0	0
	81 - 100	0	0	0	0	9	504
	101-120	15	960	0	0	6	384
	121-140	53	3,174	5	290	22	1,346
	141-160	27	1,350	54	2,736	46	2,371
	161-180	66	3,168	2	96	15	706
	181-200						
201+							
Forest Unit Subtotal		161	8,652	61	3,122	133	5,374
PjC	FTG- 20	0	0	487	1,530	28,089	24,540
	21 - 40	0	0	120	2,160	6,608	124,969
	41 - 60	56	5,443	12	1,339	163	19,257
	61 - 80	306	49,518	856	149,088	24,285	4,114,827
	81 - 100	140	27,953	641	129,868	8,336	1,692,775
	101-120	0	0	233	47,546	983	202,412
	121-140	0	0	24	2,758	399	44,533
	141-160	0	0	0	0	17	575
	161-180						
	181-200						
201+							
Forest Unit Subtotal		502	82,914	2,373	334,289	68,879	6,223,888
PjM	FTG- 20	0	0	144	173	2,021	1,308
	21 - 40	14	622	0	0	669	9,658
	41 - 60	45	5,508	0	0	19	2,326
	61 - 80	104	15,871	40	6,912	4,288	678,481
	81 - 100	43	8,411	24	4,838	1,346	261,731
	101-120	0	0	23	3,919	304	56,254
	121-140	0	0	46	2,705	12	706
	141-160	0	0	0	0	0	0
	161-180						
	181-200						
201+							
Forest Unit Subtotal		206	30,412	277	18,547	8,658	1,010,463

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PoH	FTG- 20	25	0	0	0	7,967	501
	21 - 40	2	20	6	59	678	7,411
	41 - 60	29	2,881	45	4,505	1,189	118,066
	61 - 80	2,127	262,485	845	105,432	34,427	4,272,997
	81 -100	885	119,334	1,078	145,772	19,762	2,670,190
	101-120	58	7,836	168	21,726	3,209	409,463
	121-140	16	952	16	314	300	16,954
	141-160	0	0	0	0	0	0
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		3,141	393,507	2,158	277,806	67,532	7,495,583
SpC	FTG- 20	0	0	159	288	22,540	8,426
	21 - 40	0	0	43	310	1,947	19,963
	41 - 60	0	0	56	6,275	2,047	213,833
	61 - 80	94	12,842	2,703	385,506	37,339	5,192,442
	81 -100	67	10,778	3,172	498,176	20,891	3,279,662
	101-120	14	2,218	857	135,628	4,262	675,892
	121-140	4	525	428	58,909	2,437	336,171
	141-160	4	486	335	39,342	1,099	128,841
	161-180	0	0	62	6,645	402	44,590
	181-200			12	1,066		
	201+						
Forest Unit Subtotal		183	26,848	7,827	1,132,144	92,963	9,899,820
SpL	FTG- 20	123	0	25	0	17,870	0
	21 - 40	0	0	0	0	512	862
	41 - 60	0	0	42	420	640	13,654
	61 - 80	940	82,148	281	27,393	9,476	836,655
	81 -100	548	69,150	461	57,500	7,027	885,890
	101-120	348	46,088	324	43,132	5,034	669,181
	121-140	969	121,158	694	86,116	6,226	773,885
	141-160	533	59,255	1,283	141,746	14,205	1,567,427
	161-180	1,073	109,446	899	91,646	10,445	1,065,301
	181-200	0	0	52	4,240	28	2,143
	201+	0	0	50	3,380	15	1,020
Forest Unit Subtotal		4,534	487,245	4,111	455,573	71,478	5,816,019
SpM	FTG- 20	0	0	8	0	4,233	724
	21 - 40	0	0	0	0	925	27,911
	41 - 60	48	5,376	18	2,016	1,116	114,953
	61 - 80	205	26,256	1,261	170,386	16,752	2,257,204
	81 -100	0	0	871	133,533	5,585	850,198
	101-120	0	0	156	23,252	1,210	181,432
	121-140	0	0	84	9,150	521	58,377
	141-160	0	0	61	4,441	50	4,025
	161-180	0	0	0	0	44	2,929
	181-200						
	201+						
Forest Unit Subtotal		253	31,632	2,459	342,778	30,435	3,497,753
All Forest Units Total	FTG- 20	148	0	826	1,991	85,334	35,499
	21 - 40	16	641	182	2,528	11,521	190,775
	41 - 60	597	42,608	199	16,197	13,593	1,142,728
	61 - 80	5,127	539,910	6,300	866,709	143,991	18,762,124
	81 -100	1,795	246,111	6,422	986,634	64,855	9,823,851
	101-120	435	57,101	1,806	281,594	15,720	2,267,379
	121-140	1,042	125,809	1,297	160,241	10,357	1,262,666
	141-160	564	61,091	1,754	189,315	15,458	1,704,319
	161-180	1,139	112,614	963	98,387	10,905	1,113,525
	181-200	0	0	52	4,240	28	2,143
	201+	0	0	62	4,446	15	1,020
Grand Total		10,863	1,185,887	19,863	2,612,281	371,777	36,306,029

Source: Table FMP-9 from the Armstrong Forest 2005-2010 FMP

A series of graphs have been prepared to aid in analyzing Tables 5a to 5d, for trends in forest unit area and age class structure. The two bar graphs (below) have been prepared to demonstrate the proportions and areas of productive forest that are occupied by each forest unit, through time. The forest units were grouped into broader working groups in these graphs for comparative purposes. The proportional distribution of total productive forest area into the various forest units does not vary a great deal from one term to another, as portrayed in the upper chart. For example, the proportion of the entire productive forest occupied by Spruce forest units has remained fairly stable since 1990, fluctuating between 49-52%. The White Birch forest units show the most significant proportional change (with a reduction of approximately 6%), with corresponding minor gains in the Jack Pine, Balsam Fir and Poplar forest units.

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Table 5d - Summary of Managed Productive Forest By Forest Unit (2005-2010)

MU: Armstrong Forest

Forest Unit	Age Class	Protection Forest		Production Forest			
		(ha)	(m3)	Unavailable		Available	
				(ha)	(m3)	(ha)	(m3)
BfM	FTG- 20	0	0	0	0	641	0
	21 - 40	0	0	0	0	0	0
	41 - 60	0	0	4	410	4,499	448,471
	61 - 80	10	1,260	18	2,094	4,856	556,481
	81 - 100	0	0	17	2,321	157	21,862
	101-120	0	0	45	6,390	102	13,653
	121-140	0	0	0	0	0	0
	141-160	0	0	21	1,050	0	0
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		10	1,260	105	12,265	10,255	1,040,467
BwM	FTG- 20	0	0	3	0	1,947	0
	21 - 40	0	0	13	0	181	0
	41 - 60	420	23,400	22	1,232	3,913	212,105
	61 - 80	1,341	89,531	296	19,899	12,570	853,037
	81 - 100	112	10,486	158	14,627	1,742	161,039
	101-120	0	0	0	0	612	58,708
	121-140	0	0	0	0	441	30,694
	141-160	0	0	0	0	40	1,080
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		1,873	123,417	492	35,758	21,445	1,316,663
OcL	FTG- 20	0	0	0	0	26	0
	21 - 40	0	0	0	0	0	0
	41 - 60	0	0	0	0	9	63
	61 - 80	0	0	0	0	0	0
	81 - 100	0	0	0	0	9	504
	101-120	15	960	0	0	6	384
	121-140	53	3,174	5	290	22	1,346
	141-160	27	1,350	54	2,736	46	2,371
	161-180	66	3,168	2	96	15	706
	181-200						
	201+						
Forest Unit Subtotal		161	8,652	61	3,122	133	5,374
PjC	FTG- 20	0	0	487	1,530	28,089	24,540
	21 - 40	0	0	120	2,160	6,608	124,969
	41 - 60	56	5,443	12	1,339	183	19,257
	61 - 80	306	49,518	856	149,088	24,285	4,114,827
	81 - 100	140	27,953	641	129,868	8,336	1,692,775
	101-120	0	0	233	47,546	983	202,412
	121-140	0	0	24	2,758	399	44,533
	141-160	0	0	0	0	17	575
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		502	82,914	2,373	334,289	68,879	6,223,888
PJM	FTG- 20	0	0	144	173	2,021	1,308
	21 - 40	14	622	0	0	669	9,658
	41 - 60	45	5,508	0	0	19	2,326
	61 - 80	104	15,871	40	6,912	4,288	678,481
	81 - 100	43	8,411	24	4,838	1,346	261,731
	101-120	0	0	23	3,919	304	56,254
	121-140	0	0	46	2,705	12	706
	141-160	0	0	0	0	0	0
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		206	30,412	277	18,547	8,658	1,010,463

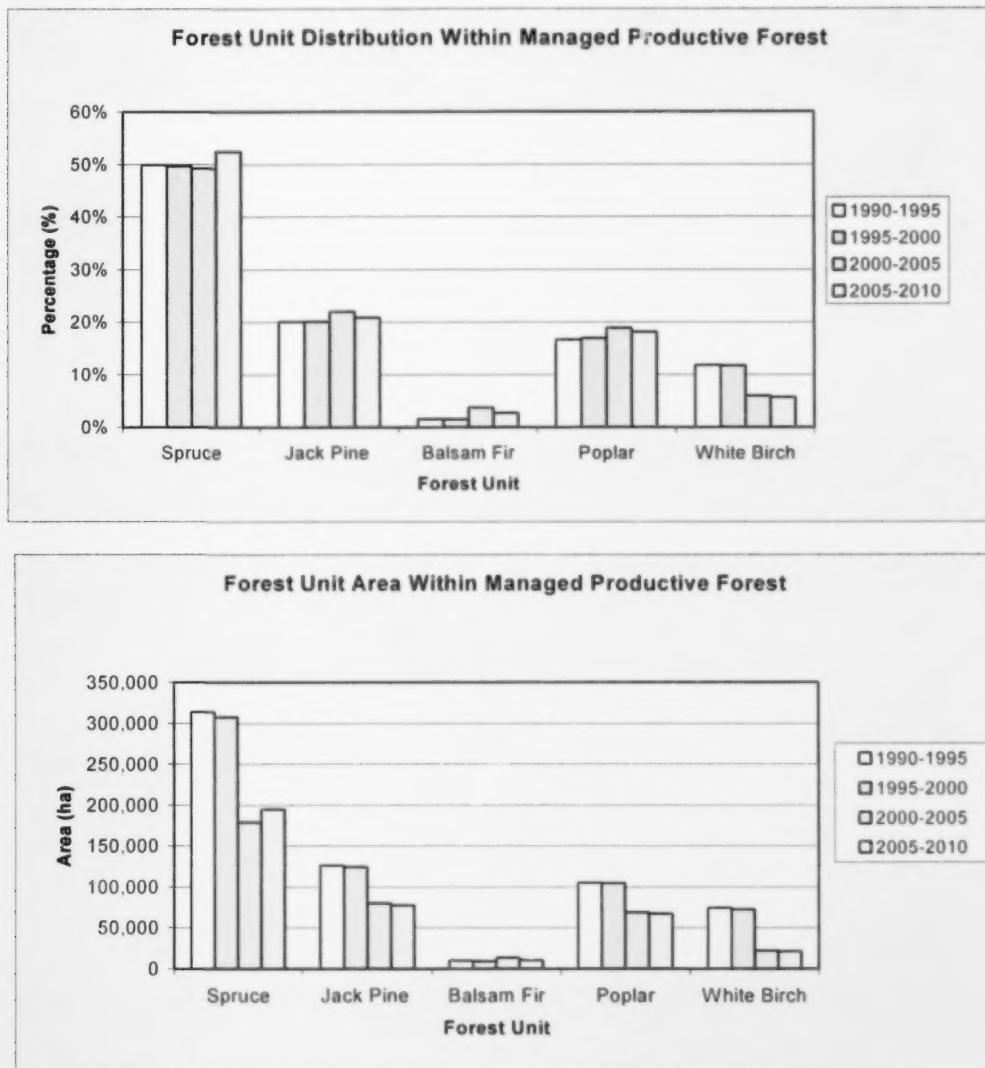
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PoH	FTG- 20	25	0	0	0	7,967	501
	21 - 40	2	20	6	59	678	7,411
	41 - 60	28	2,881	45	4,505	1,189	118,066
	61 - 80	2,127	262,485	845	105,432	34,427	4,272,997
	81 -100	885	119,334	1,078	145,772	19,782	2,670,190
	101-120	58	7,836	168	21,726	3,209	409,463
	121-140	16	952	16	314	300	16,954
	141-160	0	0	0	0	0	0
	161-180						
	181-200						
	201+						
Forest Unit Subtotal		3,141	393,507	2,158	277,806	67,532	7,495,583
SpC	FTG- 20	0	0	159	288	22,540	8,426
	21 - 40	0	0	43	310	1,947	19,963
	41 - 60	0	0	56	6,275	2,047	213,833
	61 - 80	94	12,842	2,703	385,506	37,339	5,192,442
	81 -100	67	10,778	3,172	498,176	20,891	3,279,662
	101-120	14	2,218	857	135,628	4,262	675,892
	121-140	4	525	428	58,909	2,437	336,171
	141-160	4	486	335	39,342	1,099	128,841
	161-180	0	0	62	6,645	402	44,590
	181-200			12	1,066		
Forest Unit Subtotal		183	26,848	7,827	1,132,144	92,963	9,899,820
SpL	FTG- 20	123	0	25	0	17,870	0
	21 - 40	0	0	0	0	512	862
	41 - 60	0	0	42	420	640	13,654
	61 - 80	940	82,148	281	27,393	9,476	836,655
	81 -100	548	69,150	461	57,500	7,027	885,890
	101-120	348	46,088	324	43,132	5,034	669,181
	121-140	969	121,158	694	86,116	6,226	773,885
	141-160	533	59,255	1,283	141,746	14,205	1,567,427
	161-180	1,073	109,446	899	91,646	10,445	1,065,301
	181-200	0	0	52	4,240	28	2,143
Forest Unit Subtotal		4,534	487,245	4,111	455,573	71,478	5,816,019
SpM	FTG- 20	0	0	8	0	4,233	724
	21 - 40	0	0	0	0	925	27,911
	41 - 60	48	5,376	18	2,016	1,116	114,953
	61 - 80	205	26,256	1,261	170,386	16,752	2,257,204
	81 -100	0	0	871	133,533	5,585	850,198
	101-120	0	0	156	23,252	1,210	181,432
	121-140	0	0	84	9,150	521	58,377
	141-160	0	0	61	4,441	50	4,025
	161-180	0	0	0	0	44	2,929
	181-200						
Forest Unit Subtotal		253	31,632	2,459	342,778	30,435	3,497,753
All Forest Units Total	FTG- 20	148	0	826	1,991	85,334	35,499
	21 - 40	16	641	182	2,528	11,521	190,775
	41 - 60	597	42,608	199	16,197	13,593	1,142,728
	61 - 80	5,127	539,910	6,300	866,709	143,991	18,762,124
	81 -100	1,795	246,111	6,422	986,634	64,855	9,823,851
	101-120	435	57,101	1,806	281,594	15,720	2,267,379
	121-140	1,042	125,809	1,297	160,241	10,357	1,262,666
	141-160	564	61,091	1,754	189,315	15,458	1,704,319
	161-180	1,139	112,614	963	98,387	10,905	1,113,525
	181-200	0	0	52	4,240	28	2,143
Forest Unit Subtotal		0	0	62	4,446	15	1,020
Grand Total		10,863	1,185,887	19,863	2,612,281	371,777	36,306,029

Source: Table FMP-9 from the Armstrong Forest 2005-2010 FMP.

A series of graphs have been prepared to aid in analyzing Tables 5a to 5d, for trends in forest unit area and age class structure. The two bar graphs (below) have been prepared to demonstrate the proportions and areas of productive forest that are occupied by each forest unit, through time. The forest units were grouped into broader working groups in these graphs for comparative purposes. The proportional distribution of total productive forest area into the various forest units does not vary a great deal from one term to another, as portrayed in the upper chart. For example, the proportion of the entire productive forest occupied by Spruce forest units has remained fairly stable since 1990, fluctuating between 49-52%. The White Birch forest units show the most significant proportional change (with a reduction of approximately 6%), with corresponding minor gains in the Jack Pine, Balsam Fir and Poplar forest units.

The drastic and consistent reduction of area in all forest units starting with the 2000-05 FMP (except with balsam fir which remains fairly stable), is clearly evident in the lower graph.

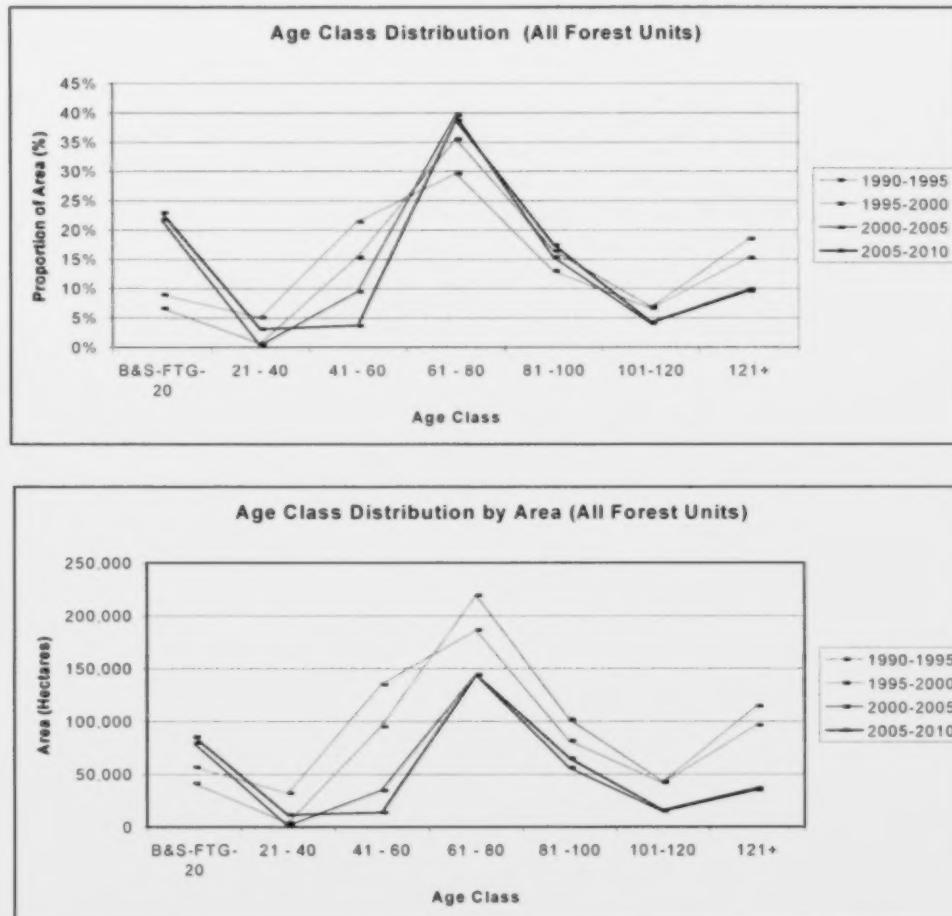


New biodiversity objectives developed for the 2000-05 FMP dealt with long-term forest unit area trends and conversions. These objectives were reflected in the long-term strategic modeling (SFMM) of the selected management alternative, by monitoring and controlling the increase or decrease in forest units area over time, through harvest and silvicultural treatments. It was determined for example, that the balsam fir forest units were artificially high as a result of succession in the absence of natural disturbance, and should occupy less area on the forest in the future. The White Birch-Mixedwood (BwM) forest unit was also modeled to decrease over time through harvest and conversion. A corresponding increase in the Spruce-Mixedwood (SpM) and Jack Pine-Mixedwood (PjM) forest units was modeled.

As discussed in Section 4.5.1 of the 2004-05 Annual Report (Forest Diversity Objectives), contained in Appendix II of this report, the forest unit composition has only seen minimal change. Over the five-year period, the BfM and BwM forest units have decreased as modeled, the PoH, OcL, and SpL forest units remain at approximately the same level, and the SpM forest unit has increased as modeled. Overall,

Table RPFO-13 (contained in the 2004-05 Annual Report for the Armstrong Forest) indicates that some progress has been made towards reaching the desired future forest condition in terms of forest unit area.

The two line graphs (presented below) plot the age class distribution for the available production forest land over four consecutive planning periods – one graph plotting the distribution by proportion of area, the other graph plotting the total area occupying each age class. To ensure that all productive forest area less than 20 years of age is accounted for and treated in a consistent fashion, the B&S/NSR areas (only reported in Tables 5a and 5b), were added to the FTG-20 age class. Similarly, all areas occupying the older age classes in Table 5c and 5d were aggregated and “capped” at 121+.



It becomes very difficult to comment with any certainty on subtle changes in forest structure trends considering the land base withdrawals that have taken place and the incorporation of the new FRI. Nonetheless, it appears that the patterns of age class distribution, by proportion (presented in the upper graph) have been fairly consistent since 1990. This is especially true from 60 years of age and older. The 61-80 age class occupies the highest proportion of area (ranging from 30-40%) in all planning inventories. The most striking changes are the consecutively lower proportions that have occurred in the 41-60 age class, as the forest has aged.

The lower graph, plotting the age class by area, indicates that the same general pattern of distribution is maintained through time. The age class structures in the 1990-95 and 1995-2000 plans (represented by the red and green lines) occupy much more area, but are somewhat similar in pattern and distinctly different than the blue and black lines representing the subsequent two planning periods (and virtually

mimic each other). The differences between the two series (pre and post-2000) demonstrate the effects of the significant reduction in Crown Managed land area (approximately 41%) in concert with a new FRI. It is apparent that the land base withdrawals occurred across all age classes.

As with the upper graph, notable differences started taking place between 1990 and 1995, with the loss of area in the 41-60 age class, and a resulting gain in the 61-80 age class. Considering that there was very little change in the total productive forest area, it appears that this was simply the result of 55-60 year old forest in 1990 shifting into the 61-65 age class during the 5-year period. There was minimal area 35-40 age class to move up into the 41-45 age class to replace the area which shifted up into the 61-65 age class. Other notable shifts between age classes have occurred with the reduction of older forest (starting in the 2000-05 FMP), and a corresponding increase in the youngest age class (which includes B&S and depletions). This is a result of natural forest succession (incorporating changes reflected in the new FRI) and natural disturbance (fire) or harvest activity (supported by depletions reported in Table 4).

A graph showing the changes in age class distribution over the 5-year term of the 2000-05 FMP has also been included in Section 4.5.1 of the 2004-05 Annual Report, included in Appendix II of this report. There has been minimal change, most of which can be attributed to ageing of the forest. Harvesting and the blowdown/snow damage have contributed to the increase in the youngest age class.

## 2.6 Summary Report of Renewal, Tending and Protection Operations

Trend Analysis Table 6 provides an overview of planned versus actual renewal, tending and protection activities during the 1990 to 2010 period on the Armstrong Forest. The table shows all forest units combined, for the applicable 5-year periods (the values have not been annualized). Actual values for the 2005-06 AWS period are not yet available.

Table 6 reveals that the actual natural regeneration levels have moved closer to the planned levels over the course of three planning terms. During the 1990-95 TMP, no area was formally reported as naturally regenerated in clearcut areas. There were in fact, significant areas regenerating by natural means, but they were simply not reported by the MNR at the time. (Silvicultural activities and the associated reporting requirements on the Armstrong Forest were the responsibility of the MNR during the 1990-95 period). Another reason for the shortfall in natural regeneration was that planned strip cutting in the lowland spruce forest unit did not take place.

During the 1995-2000 period, some strip cutting was reported. Careful Logging Around Advance Growth (CLAGG) harvest activities were also undertaken during this period, and have since taken the place of strip cutting. Only 15% of the forecast areas for natural regeneration in the 5-year 1995-2000 TMP was reported, again primarily for the same reason as mentioned above. Reporting of natural regeneration began with the 1997-98 annual report, which represented the first year under the terms and conditions of the SFL. Another factor for this shortfall included the lower than planned harvest levels, especially in hardwood stands. There were also some delays with reporting natural regeneration treatments due to delays with the final mapping of cutovers and artificial treatments in adjacent areas.

The actual areas being regenerated naturally during the 2000-05 FMP term were fairly close to planned levels, attaining a 93% level of achievement. It must be recognized that the areas reported for natural regeneration are not normally reported in the year in which the disturbance occurred, to allow for the completion of cutover mapping and the completion of artificial regeneration activities. There are some additional areas that have not been reported yet due to these types of timing delays.

During the 1990-95 period, the artificial regeneration program (planting plus seeding) was only 48% of planned operations, primarily due to the significantly lower than planned harvest levels, as reported in Table 2. Bareroot planting specifically was lower than planned in 1990-95 because of lower harvest levels in the hardwood and mixedwood stand conditions, and because of MNR's "envelope" funding policies were enacted during the planning period. Envelope funding imposed funding limitations but enabled forest managers more latitude in deciding which types and levels of silvicultural activities were conducted on each unit. Given this situation, container stock became progressively favoured over bareroot during this

timeframe because of the types of sites harvested and the lower growing and planting costs associated with container stock. Bareroot planting was completely phased out by the end of the 1996 planting season.

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**Table 6 - SUMMARY REPORT OF RENEWAL, TENDING AND PROTECTION OPERATIONS**

MU: Armstrong Forest

	Area Summary of all Forest Units (ha)							
	1990-1995 <sup>1</sup>		1995-2000 <sup>2</sup>		2000-2005 <sup>3</sup>		2005-2010 <sup>4</sup>	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
<i>Renewal</i>								
Regeneration								
Uneven-Aged Management								
Selection Cut - Harvest								
Total Uneven-Aged Management								
Even-Aged Management								
Natural Regeneration								
Clearcut	6,016	0	14,752	281	5,679	5,003	6,025	
Strip Cut/ CLAAG	5,543	0	6,000	2,858	5,973	5,884	3,393	
Seed Tree Cut	0	0	0	0				
Uniform Shelterwood Seed Cut								
Subtotal Natural	11,559	0	20,752	3,139	11,652	10,887	9,417	0
Artificial Regeneration								
Planting	7,582	4,552	7,500	7,845	8,472	10,322	8,659	
Seeding direct with site preparation	2,000	86	2,500	2,264	2,426	980	1,518	
Scarification								
Subtotal Artificial	9,582	4,639	10,000	10,109	10,898	11,302	10,177	0
Total Even-Aged Management	21,141	4,639	30,752	13,249	22,551	22,189	19,595	0
Total Regeneration	21,141	4,639	30,752	13,249	22,551	22,189	19,595	0
Site Preparation								
Mechanical	11,500	4,349	8,446	12,094	10,210	10,110	10,018	
Chemical	500	0	605	0	0	0	140	
Prescribed Burn	1,000	92	1,054	0	0	0	151	
Total Site Preparation	13,000	4,441	10,105	12,094	10,210	10,401	10,018	0
Tending								
Cleaning								
manual	0	165	250	343	1,187	402	520	
chemical - ground	500	0	50	0	551	532	780	
- aerial	6,106	1,618	4,750	2,652	9,633	4,505	8,698	
mechanical	0	0	0	0	0	0		
prescribed burn								
Spacing, pre-commercial thinning, improvement cutting								
even-aged	250	0	250	242	1,500	414	500	
uneven-aged								
Cultivation								
Total Tending	6,856	1,783	5,050	2,894	12,870	5,852	10,498	0
Protection (Insect Pest Control)								
accelerated harvest								
salvage								
manual protection								
ground insecticide								
aerial insecticide								
Total Protection								

1. Source: Planned numbers are from Table 4.19 of the Armstrong Forest 1990-1995 TMPs. Actual numbers are from Table RPFO-7 (for the 5-year period 1990-1995), contained in the Report of Past Forest Operations for the Armstrong Forest 2000-2020 FMP.

2. Source: Planned numbers are from Table 4.19 of the Armstrong Forest 1995-2000 TMP. Actual numbers are from Tables RPFO-7 for the Armstrong Forest (for a 5-year period from 1995-2000), contained in the Report of Past Forest Operations for the Armstrong Forest 2005-10 FMP.

3. Source: Planned numbers are from Table FMP-25 for the Armstrong Forest 2000-2005 FMP, plus Table 25a from Amendments # 30 and #31. Actual numbers are from the "Actual to Date" columns in Table AR-7 for the Armstrong Forest 2004-2005 Annual Report.

4. Source: Planned numbers are from Table FMP-25 of the Armstrong Forest 2005-2010 FMP. A summary of actual 2005-06 operations is not yet available.

Actual planting operations have progressively exceeded planned operations since 1995. More tree planting was conducted during the 2000-05 FMP term than forecast (122%) due to site conditions encountered in the field being better suited to tree planting than forecast (at the expense of forecast natural regeneration or aerial seeding treatments). The implementation of several Forestry Futures Projects on salvage harvest areas during the FMP term also influenced this result.

These Forestry Futures projects included:

- Project #330-2-R10 that involved the treatment of 395 hectares of salvage areas and juvenile stands in the Holland and Rapid Lake areas burned by wildfire during the summer of 1996.
- Project #382-2-R12 involved the treatment of 118 hectares of salvage areas in the Linklater Lake area burned by wildfire during the summer of 1996.
- Three additional projects were implemented during the latter part of the 2000-05 period and into 2005-06, to address the requirements of regenerating areas affected by the 2001 blowdown/snow damage. Project #470-2-R17 (1,584 hectares of salvage area across the Armstrong Forest); Project #487-2-R18 and Project #540-2-R20, which together totaled 560 hectares of damaged juvenile jack pine stands in the Bukemiga, Mattice, and Pikitigushi areas.

Actual achievement of direct seeding was below planned operations in each FMP period. During the 1990-95 period this was primarily because of lower than planned harvest levels, but additionally, there was generally only enough area site prepared each year to accommodate the planting stock that was committed to and being grown during that period. Aerial seeding increased during the 1995-2000 term, achieving 90% of planned but fell again during the 2000-05 period, achieving 40% of planned operations. The shortfall in 2000-05 was a result of (and offset by) increased planting levels during the first two years of FMP implementation resulting in less area being available for aerial seeding. There was also an unavailability of areas forecast for aerial seeding in operating blocks 200 and 202 due to the outstanding bump-up request. Another consideration was the fact that many sites that were suitable for aerial seeding were too small in area and therefore economically unfeasible to treat.

Mechanical site preparation was below planned levels during the 1990-95 period due to funding constraints. The program was, however, maximized by placing emphasis on light site preparation rather than the more expensive heavy site preparation. Mechanical site preparation equipment during the 1990-95 planning period included three-row Bracke and TTS disc trencher. The utilization of this light site preparation equipment was quite effective and was well suited to the sites treated.

During the 1995-2000 period, the actual levels of mechanical site preparation exceeded the FMP forecast (actual was 143% of planned) due to increased harvest levels, relative to the previous plan. This treatment also compensated for the lack of chemical site preparation and prescribed burning during this period. It is evident in Table 6 that mechanical site preparation operations have become much closer to planned over the consecutive planning periods, actually achieving 99% of planned levels during the 2000-05 FMP period.

In addition to the traditional TTS disk trencher mechanical site preparation activities that occurred during the 2000-05 FMP period, 230 hectares of young jack pine stands that were destroyed by the 2001 snow/wind storm, were mulched in preparation for replanting. This activity began in earnest during the 2004-05 AWS, as part of Forestry Futures Project #497-2-R18. The mulching operations were experimental in nature, using different equipment (including a Delta DT-530RT tractor with a Fecon Bullhog BH350 and Hydro-Ax mulching heads) in a variety of patterns. This program continued into the 2005-06 AWS, with an additional 327 hectares being treated.

Chemical site preparation and prescribed burning (PB) were planned in the 1990-95 and 1995-2000 TMPs. No chemical treatments were undertaken because of the lack of suitable site conditions (hardwood and mixedwood stands) made available for this treatment. Only a minimal number of hectares were prescribed burned (92 hectares were burned in a PB conducted in 1991) due to operational constraints and funding limitations. No prescribed burns were planned during the 2000-05 FMP period, however areas affected through slash pile burning (151 ha) have been recorded in the "Actual" column in Table 6. A concerted effort has been undertaken by Domtar over the 2000-05 FMP period to reduce slash piles and recover more productive land. The following recommendation was offered by the previous auditors in 2001: "Roadside slash piles are to be reduced or eliminated on the Armstrong Forest". A detailed discussion of the actions developed and taken in this regard can be found in the *Armstrong Forest 1995-2001 Independent Forest Audit Action Plan Status Report*, approved by the MNR in November, 2005. A brief summary of actions taken includes the following:

- Alternative methods of slash piling have been investigated and documented.
- The currently used method of slash disposal (piling with a skidder and burning) is the most cost effective approach and is able to produce the desired results.
- Gains have been made in piling and burning some winter harvest areas.
- Mulching of some slash piles near the town of Armstrong took place.
- Slash piling and burning were more closely monitored for effectiveness, through the compliance inspection and monitoring program.
- This topic has been discussed at annual silviculture meetings with Domtar and the overlapping licensees, focusing on effectiveness and methods of improvement.

Manual tending has not traditionally formed a large part of the total tending program on the Armstrong Forest, but there has been an increasing amount through the progressive planning terms in recent history. There was no area planned for manual tending in the 1990-95 TMP, however, 165 ha of jack pine was tended during the 1990-95 term primarily through work programs with Whitesand First Nation.

There was an overachievement of manual tending (137%) during the 1995-2000 period. Whitesand First Nation had expressed concern over Domtar's preferred approach with the aerial application of herbicides, and through information exchange sessions between Domtar and the Whitesand community, an improved understanding of the intent of the tending program and Whitesand's concerns with it has resulted. In response to Whitesand concerns, manual tending replaced aerial application of herbicides in certain areas identified by Whitesand, leading to the overachievement of the target during the 1995-2000 period.

During the 2000-05 term, a total of 402 hectares of manual tending was completed. This was significantly below the forecast level due to a number of factors, including the narrow window of operation for manual tending, shortages in suitably qualified individuals to complete the project for Whitesand Forestry and the fact that alternative treatments (such as basal bark application or foliar application) generally produce better results at less cost. As a result, during this period a total of 532 hectares of ground tending was completed (including both backpack spray and basal bark). This is actually significantly higher than the forecast level (228 ha) originally identified Table FMP-25. The 551 hectares reported as planned in Table 6 is somewhat misleading since it includes 313 hectares associated with Amendment # 30.

A total of 1,618 hectares were aerial tended during the 1990-95 planning term, achieving only 26% of the planned areas. This relatively low level of achievement was the result of less harvesting, less competitive sites being harvested, constrained aerial tending programs due to funding and concerns expressed by Whitesand First Nation during the first three years of the plan, and no aerial tending programs during the last two years of the plan.

Aerial tending during the 1995-2000 period increased to 2,652 hectares, with the level of achievement rising to 56% of planned. The shortfall was due to a number of factors. In 1996 the entire aerial tending program was cancelled due to issues over proposed spraying in blocks being utilized by fall bear hunters. In 1998, the program was again cancelled since Whitesand First Nation concerns could not be resolved prior to start-up. Aerial tending programs in 1999 and 2000 were scaled back through on-going discussions and consultations with Whitesand First Nation to address specific concerns. In addition, and as mentioned previously, some of the area dropped from aerial tending during this period was replaced by manual tending operations.

During the 2000-05 FMP period, a total of 4,505 hectares of aerial tending was completed, achieving 47% of the FMP forecast level. A number of reasons have contributed to this level, including:

- Reductions in the aerial tending program to address specific concerns identified by Whitesand First Nation.
- The late start-up of aerial tending operations during some AWS periods, particularly in 2003-04 and 2004-05.
- Deferral of treatment of areas due to the establishment of temporary camps within or adjacent to the blocks.

- The specific size, location, and configuration of areas identified for tending during the 2000-05 FMP period, the size and type of competition to be controlled, and the size, type and distribution of crop trees within areas identified for treatment.

Discussions with the Whitesand First Nation have been on-going for a number of years to address Whitesand concerns around the aerial application of herbicides in future AWS periods. A series of meetings and educational sessions have been initiated by Domtar forest management staff to promote a mutual understanding of the impact of herbicide use as a Forest Management tool. In addition, in recent years, Whitesand First Nation has participated in helicopter surveys to identify tending areas. Whitesand First Nation's participation, assistance and input in past surveys has been greatly appreciated and beneficial to all parties, and Domtar looks forward to their collaboration regarding tending issues in the future.

Pre-commercial thinning operations on the Armstrong Forest began during the 1995-2000 TMP period. The actual levels were very comparable to planned levels at that time. In the development of the 2000-05 FMP, 1,500 hectares were identified as best estimates of candidate thinning areas - 1000 hectares of 10-20 year old aerially seeded jack pine (PjC) stands and 500 hectares in poplar (PoH) stands. The plan stipulated that the candidate sites would require field verification prior to treatment, and in the poplar stands specifically, that experts from Longlac Wood Industries should be involved to identify which stands should be managed for veneer production.

The level of pre-commercial thinning in jack pine approximated the forecast level during the first two years of FMP implementation, but no pre-commercial thinning was conducted after 2002 due to the snow and wind storm that caused damage to many of the candidate thinning areas in the fall of 2001. Although 500 hectares have been included in the 2005-10 FMP, it is anticipated that pre-commercial thinning levels in jack pine will continue to be very small in the early years of the plan (until more stands become suitable). No pre-commercial thinning (juvenile spacing) of PoH stands was conducted during the 2000-05 period, nor did any field verification of PoH stands (required by experts from Longlac Wood Industries) occur. No pre-commercial thinning of PoH stands has been planned in the 2005-10 FMP.

Overall, during the five-year FMP term, the renewal program was slightly larger than planned, primarily due to the snow and wind storm of October 2001 and the related salvage harvest operations and remedial work completed. The tending program was significantly below planned, primarily due to the low levels of aerial tending and pre-commercial thinning. The renewal program is on track to produce the desired results, however, it is recognized that additional tending is required to produce the desired future forest condition.

## 2.7 Harvested Area Successfully Regenerated

Trend Analysis Table 7 is intended to provide a general indication of how much area is actually being successfully regenerated relative to the area being harvested. It is recommended in Appendix C of the IFAPP to use a 10-year delay from the end of the audit period (2006) in reporting the harvest area in this table, to address the time lag that normally occurs prior to the point when regeneration is likely to be assessed for success. This would suggest reporting harvest area based on depletions from 1991 to 1996.

To best demonstrate the most reliable trend in light of the overlap of planning terms associated with this audit, and to incorporate the most accurate information as possible, a 6-year timeframe was used for this assessment. This allowed intact 5-year RPFO data to be used to the fullest extent, rather than individual annual reports spanning two planning periods. (Annual reports quite often do not have complete data for the year and over a 5-year period, are not always as accurate as the RPFO).

Accordingly, Table 7 reports the total area surveyed during the 2000-05 FMP period plus what was surveyed in the 2005-06 AWS, relative to the total area harvested during the 1990-95 TMP timeframe, plus what was harvested during 1995-96. In this manner, 5-year RPFO information relative to harvest operations that occurred during the entire 1990-95 TMP and regeneration survey data that occurred

during the 2000-05 FMP, remains intact. The extra year's worth of data simply provides a more meaningful assessment.

It is also suggested in Appendix C of the IFAPP to report survey results on areas that correspond exactly to the same areas recorded as harvested. This was not done in this case since not all of the background data was readily available in an electronic format (specifically the year of harvest for the areas surveyed). The year of harvest was not provided or required in the 5-year totals in Table AR-14 of the 2004-05 Annual Report, or in previous annual reports following the requirements of the 1996 FMPM in Table AR-7. Most of the areas surveyed during the 2000-05 timeframe, in an effort to tidy-up some backlog area, were actually harvested in the late 1970's and 1980's.

Areas are normally assessed for Free-to-Grow (FTG) status five to seven years after treatment (planting/seeding) on artificially regenerated sites, and five to seven years after harvest on naturally regenerated sites. Generally, planting/seeding occurs between one and three years after harvest. However, as discussed below, the FTG surveys that were scheduled to occur in the last two years of the 2000-05 FMP, and that would have covered much more area harvested during the 1990-95 period, did not take place.

In Table 7 the harvested area for the 6-year period 1990 to 1996 has been reported and amounts to 12,641 hectares. Table RPFO-1 for the 1990-95 TMP period, and Table AR-1 from the 1995-96 Annual Report have been used as the sources for this depletion information.

Over the 5-year period of the 2000-05 FMP, a total of 6,855 hectares were assessed, as reported in Table AR-14 in the 2004-05 annual report. All FTG surveys during this period occurred during the first three years of the plan. No surveys were done in 2003-04 or 2004-05 due to the reduction of helicopter surveys undertaken to identify candidate tending areas. (Regeneration assessments were generally conducted in conjunction with candidate tending area surveys.) Additionally, the 2001 blowdown/snow storm limited the resources that could be allocated to regeneration assessment.

An additional 4,733.2 hectares have been included in Table 7 from work undertaken in 2005-06, bringing the total area surveyed up to 11,588 hectares. A great deal more Free-to-Grow work was completed during the 2005-06 AWS (an additional 5,335 hectares surveyed), but unfortunately the results for these particular areas have not been summarized at this time.

A factor of 4% of the harvested area has been used to reflect the areas that have been lost as roads and landings. This is consistent with modeling done in the 2005-10 FMP (as outlined in Part 2, Section 3.1.4 of the Analysis package, contained in Appendix A1 of the FMP).

Of the total area surveyed for success, 7,931 hectares were declared FTG, representing an achievement of almost 68.4%. All areas surveyed during the 2000-05 period were incorporated into the planning inventory for the 2005-10 FMP as productive growing forest. In general, much of the area deemed not to be a regeneration success (3,657 hectares) actually met the minimum stocking and height requirements specified in the applicable silvicultural ground rules. But due to the proliferation of hardwood competition (in stands targeted to be conifer-dominated), it was determined at the time that some follow-up treatment may be required before these stands met the desired standards.

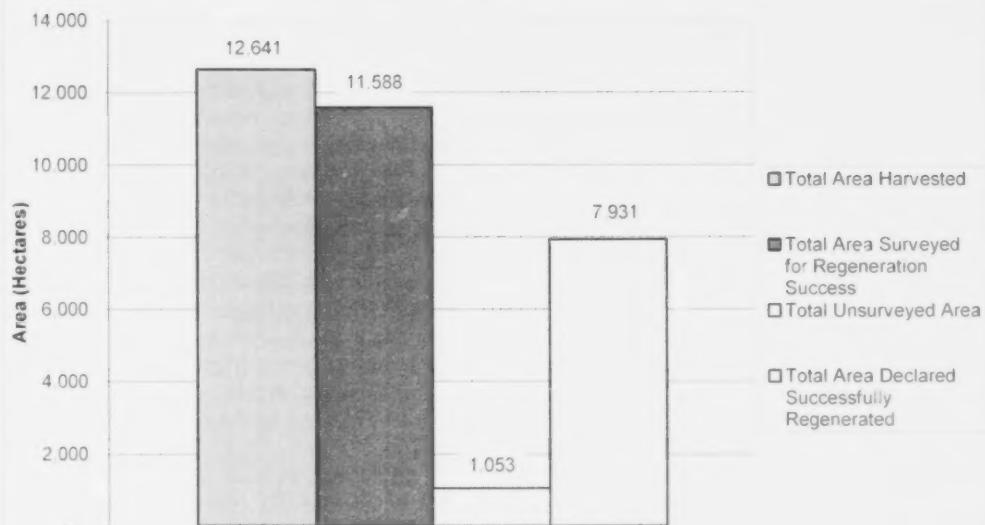
The reductions in the aerial tending program to address specific concerns identified by Whitesand First Nation has led to some of the issues discussed above concerning hardwood competition in conifer-dominated stands. A recommendation related to this problem was offered by the previous auditors in 2001: "The OMNR and Domtar should continue to monitor stand development in the Flat Lake area. If conifer-dominated stands are not adequately regenerating, the OMNR and Domtar should work with the Whitesand Band to develop acceptable silvicultural prescriptions".

**2006 Independent Forest Audit**

**Table 7- Harvested Area Successfully Regenerated**

**MU: Armstrong Forest**

	AREA IN HECTARES (All Forest Units Combined)
	Even-aged Management
Total Area Harvested	12,641
Total Area Surveyed for Regeneration Success	11,588
Total Unsurveyed Area	1,053
Total Area Declared Successfully Regenerated	7,931
<b>Total Area Surveyed Not Successfully Regenerated</b>	<b>3,657</b>
NSR	
B&S	
Not Available for Regeneration (eg. Roads & landings)	506
Other	
<b>Percent of Area Surveyed Declared Successfully Regenerated</b>	<b>68.4%</b>



**Source:**

Total Harvest Area is from Table RPFO-1 for the 1990-95 TMP period, plus area harvested (Table AR-1) in 1995-96. Total Area Surveyed for Regeneration Success is from AR-14 for the 2004-05 Annual Report, plus available FTG data undertaken in 2005-06.

A detailed discussion of the background to this issue and the actions developed and taken in this regard, can be found in the *Armstrong Forest 1995-2001 Independent Forest Audit Action Plan Status Report*, approved by the MNR in November, 2005, but a brief summary includes the following:

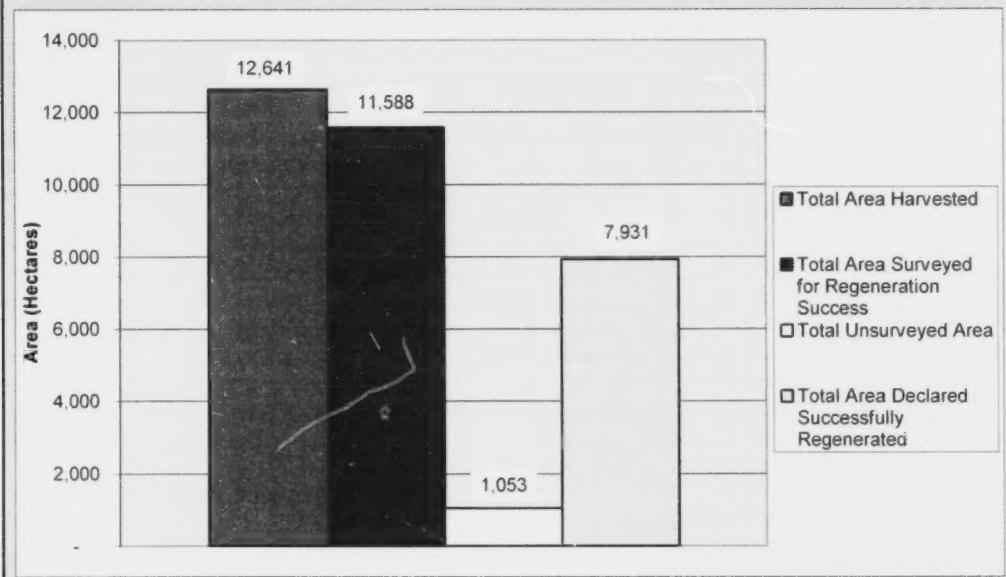
- The fact that some stands are regenerating to mixedwood or hardwood-dominated conditions may threaten the desired levels of future caribou winter habitat (conifer-dominated stands).
- Stands in the Flat Lake area were treated primarily with jack pine seeding.
- Monitoring of stand development occurred in 2002, with approximately 143 hectares being declared FTG.
- As per the Silvicultural Ground Rules (SGRs), most of the assessments were scheduled for 2005.

**2006 Independent Forest Audit**

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- The fact that some stands are regenerating to mixedwood or hardwood-dominated conditions may threaten the desired levels of future caribou winter habitat (conifer-dominated stands).
- Stands in the Flat Lake area were treated primarily with jack pine seeding.
- Monitoring of stand development occurred in 2002, with approximately 143 hectares being declared FTG.
- As per the Silvicultural Ground Rules (SGRs), most of the assessments were scheduled for 2005.

- Ground stocking surveys were conducted in 2000, with additional aerial surveys in 2002.
- Consultation with Whitesand First Nation regarding the tending program has been completed annually since 2002.

## APPENDIX I

### EXCERPTS from the 2004-05 ANNUAL REPORT for the ARMSTRONG FOREST

- **Synopsis of Forest Operations Pertaining to the 2000-05 FMP**
- **Additional Requirements for the Year Ten Annual Report**

*Note: The text in this appendix is composed of excerpts from the 2004-05 Annual Report. The reader is advised to consult the original document (located at the MNR, Nipigon and Domtar, Red Rock offices) for the most detailed and accurate information as it has been edited extensively for this summary.*

### Synopsis of Forest Operations Pertaining to the 2000-05 FMP

During the five-year term of the FMP (2000-05), forest management activities on the Armstrong Forest were influenced by the snow and wind storm of October 2001. The storm impacted harvest levels through focusing the operations on salvage harvest areas, both within FMP allocations and salvage areas identified through amendment planning. Utilization levels were impacted by this focus on salvage and the lower than forecast yields resulting from the damage across the Armstrong Forest. Similarly, the storm impacted the regeneration program with a focus on the salvage harvest areas resulting in increased levels of planting and site preparation. The storm also resulted in a focus on the remediation of damaged juvenile jack pine stands and precluded the implementation of the pre-commercial thinning program during the latter part of the FMP period.

As outlined in Section 2.3.1 Harvest, during 2004-2005, harvest levels were below the average annual forecast level in the 2000-2020 Forest Management Plan for the Armstrong Forest for a number of reasons, including the continuation of the outstanding bump-up request for most of 2004-2005, the focus of Buchanan Forest Products operation on other forest management units, the continued limited marketability of birch, and the limited operation of Whitesand Forestry. Harvest levels were also below the levels identified in the 2004-2005 Annual Work Schedule since the AWS contained the remainder of the 2000-2005 allocations.

As outlined in Sections 2.3.1 Harvest and 2.3.2 Utilization, during the implementation of the 2000-2020 FMP, the concentration of harvest operations in salvage harvest areas identified through amendment planning, particularly in the 2002-2003 and 2003-2004 AWS periods resulted in below forecast depletion and utilization levels. Additional contributing factors included the bump-up request that remained outstanding for the majority of the 2000-2005 FMP period, machine availability being affected by operations on other management units, variable weather conditions, poor market conditions and economic atmosphere during the 2000-2005 FMP period, limited hardwood markets (particularly birch), the limited operation of Whitesand Forestry, wood remaining to be hauled, and lower yields due to the blowdown/snow damage.

Many of the renewal and tending activities reported in the 2004-2005 Annual Report for the Armstrong Forest approximated the levels identified in the 2004-2005 Annual Work Schedule. The tree planting (99% of planned), site preparation (118% of planned), and basal bark tending (100% of planned) projects approximated scheduled levels. The natural regeneration (138% of planned), and the aerial seeding projects (180% of planned) were above scheduled levels. The aerial tending (18% of planned), and cone collection (24% of planned) projects were below scheduled levels. No backpack tending or manual tending was conducted during 2004-2005.

Overall, during the five-year FMP term, the renewal program was slightly larger than planned, primarily due to the snow and wind storm of October 2001 and the related salvage harvest operations and remedial work completed. The tending program was significantly below planned, primarily due to the low levels of aerial tending and pre-commercial thinning. The renewal program is on track to produce the desired results, however, it is recognized that additional tending is required to produce the desired future forest condition. Domtar will continue to work with Whitesand to develop a mutually acceptable approach to tending on the Armstrong Forest (see Section 4.2 Review of Renewal and Tending Activities below).

The level of pre-commercial thinning in jack pine approximated the level forecast in the 2000-2020 Forest Management Plan during the first two years of FMP implementation. However, in the third, fourth, and fifth years, no pre-commercial thinning was conducted due to the snow and wind storm that caused damage to many of the candidate thinning areas in the fall of 2001. Many of these areas were assessed in November 2002 and the most severely damaged areas have been scheduled for treatment in 2003 and beyond. However, it is anticipated that there will continue to be little to no jack pine thinning in future AWS periods due to the snow and wind storm.

During the first two years of FMP implementation, assessment of regeneration success was relatively low with considerable assessment conducted in 2003-2004. However, no regeneration assessment was

conducted in 2003-2004 and 2004-2005 due to the limited aerial helicopter use for tending surveys. Areas are selected for assessment based on the geographic distribution and the timing of regeneration assessment (see section 2.3.10.3, Regeneration Assessment and Silvicultural Success) of scheduled areas. Considerable area has been scheduled for assessment in the 2005-2006 AWS.

No new primary or secondary access roads were constructed in 2004-2005 (see Section 2.3.8 Roads). However, a number of primary and secondary roads were maintained during the 2004-2005 AWS period, primarily in the form of grading and plowing, with work at water crossings being conducted on Road 5000 (Ferland Road), Road 6000 (McKinley Road), and the Obonga Road. During the five-year FMP term, the level of access road construction did not meet the forecast level in the 2000-2020 Forest Management Plan since secondary road 501 was not be required since most of this road was actually constructed during the 1995-2000 Timber Management Plan, and primary road 2000 was subject to the outstanding bump-up request for the majority of the FMP period.

As outlined in Section 2.3.12 Community Needs and Socio-Economic Concerns, below, the Local Employment and Economic Development strategies identified in the 2000-2020 FMP have been met as a result of virtually all renewal and tending activities being conducted by local community members and businesses and a large portion of the harvesting, processing, road construction, and support activities being conducted by local community members and businesses. However, due to difficulties experienced by Whitesand Forestry in 2004-2005, employment offered to Whitesand members by the forest company was limited during this AWS period.

As outlined in Section 2.3.13, Other Activities, below, a number of initiatives are being implemented on the Armstrong Forest that contributes to Domtar's overall commitment to strive for leadership and continuous improvement in forest management.

#### **4.0 Additional Content Requirements for Last Year of FMP**

This portion of the Annual Report documents the requirements of a "Year Ten Annual Report" since 2004-2005 was the last year of the five-year plan term (2000-2005). Therefore, this section includes an analysis of forest disturbances, review of renewal and tending activities, review of forest modeling assumptions, an assessment of objective achievement, and determination of sustainability.

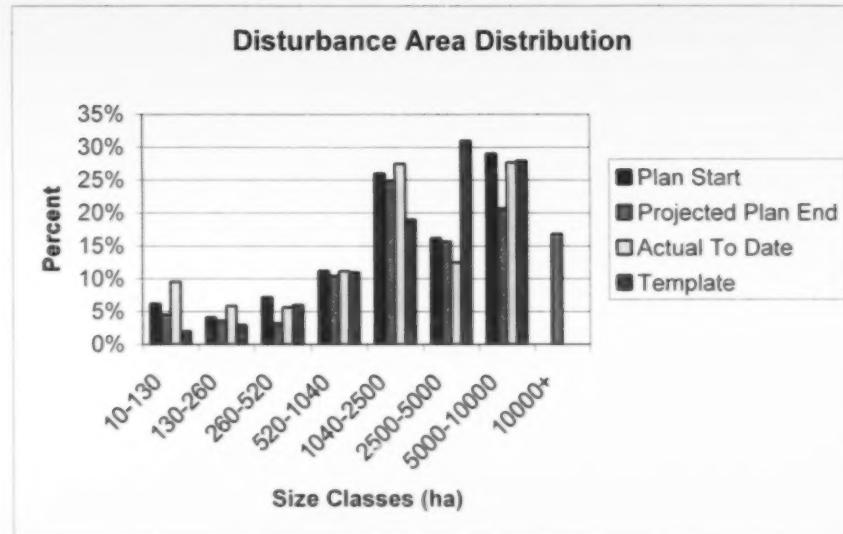
#### **4.1 Analysis of Forest Disturbances**

Table AR-15 summarizes the frequency of disturbances on the Armstrong Forest for the ten-year period 1996-2005. This period was utilized since this was the period utilized for the analysis in the 2000-2020 FMP. Disturbance analysis was completed using the NDPEG Tool to determine disturbance perimeters. It should be noted that this method is different than the method utilized to determine the plan start and projected plan end distributions of disturbance frequency. However, since similar rules were utilized regarding separation distances, etc., similar results should be achieved.

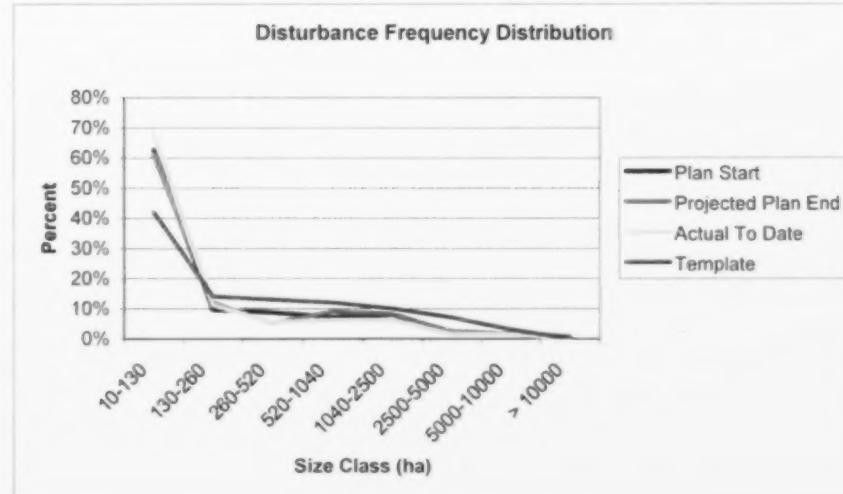
As outlined in Table AR-15 and illustrated in the graph below, at the end of the 2000-05 FMP period, the actual disturbance frequency for 1996-2005 disturbances closely approximates the natural template developed for the 2000-05 FMP. However, during the 2000-05 FMP, there was slight movement away from the natural template as developed for the 2000-05 FMP. This is primarily the result of the additional disturbances created through the blowdown/snow damage salvage through 2002-05, resulting in more small disturbances than originally forecast. In addition, the balancing of FMP objectives, particularly spatial allocation decisions, resulted in differences between the natural template and the forecast and actual frequency distributions for the Armstrong Forest.

The main differences between the 1996-2005 disturbances and the natural template developed for the 2000-2020 FMP are in the 10-130 hectare size class which contains a higher disturbance frequency than the template and the 2500-5000 hectare size class which contains a lower disturbance frequency than the template. It also should be noted that the forecast disturbance larger than 10000 hectares was not produced on the landscape during the 2000-2005 FMP period. Therefore, the 1996-2005 actual

disturbance frequency was partially shaped by the plan start frequency distribution and the sizes of disturbances produced during the 2000-2005 FMP period.



Similarly, the actual area distribution for 1996-2005 disturbances closely approximates the area distribution of the template developed for the 2000-2020 FMP (as illustrated in the graph below). As for frequency distribution above, the primary differences between the actual 1996-2000 area distribution are in the 10-130 hectare size class and the 2500-5000 hectare size class.

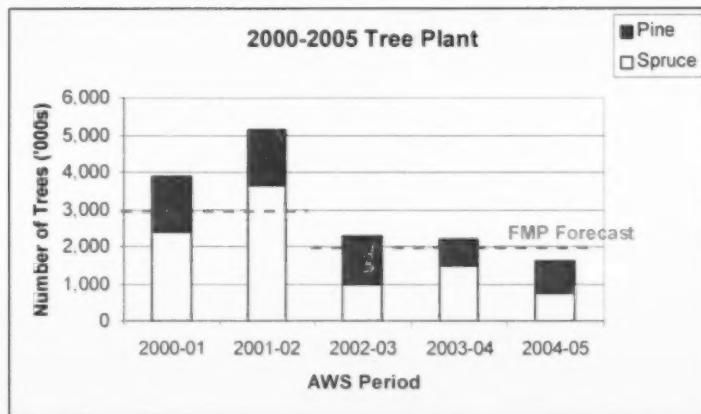


Future FMP periods should work towards the template through the creation of fewer small disturbances and the creation of more disturbances in the larger size classes, particularly the 2500-5000 hectare size class. This may be partially accomplished through the conglomeration of smaller disturbances. In addition, revised natural template information, size classes and analysis methods may result in slightly different results.

## 4.2 Review of Renewal and Tending Activities

### 4.2.1 The Amount of Renewal and Tending Operations to Date

During the 2000-05 FMP period, a total of 10,887 hectares of natural regeneration were reported in both salvage and regular harvest areas, achieving 93% of the FMP forecast level (as amended for salvage harvest operations). As outlined above in Section 2.3.5.1 of the annual report, additional natural areas from 2004-05 are expected to be reported in the 2005-06 annual report.



A total of 15.1 million trees were planted compared to a forecast level of 12.3 million trees. The graph below outlines the planting achievement relative to the FMP forecast, on an annual basis. A total of 9,764 hectares of regular harvest areas were regenerated through planting which is well above the forecast level of 6,825 hectares (143%). In addition, 558 hectares of salvage harvest areas were regenerated through planting. More area than forecast was planted due to:

- The implementation of several Forestry Futures Projects on salvage harvest areas.
- More areas were suited to tree planting than forecast in the FMP due to the site conditions encountered in the field.
- Tree planting densities were below the level identified in the FMP (primarily due to the quantity and distribution of natural regeneration on site and anticipated ingress).
- The high levels of tree planting in the first two years of FMP implementation due to the high harvest levels during the final two years of the 1995-2000 FMP.

A total of 777 hectares of aerial seeding was conducted on regular harvest area for the 2000-05 FMP period. In addition, 203 hectares of aerial seeding was conducted on salvage harvest areas. The aerial seeding target identified in the FMP (2,214 hectares) was not achieved for a number of reasons, including:

- Increased planting levels during the first two years of FMP implementation.
- The unavailability of areas (in blocks 200 and 202), due to the outstanding bump-up request.
- The lack of suitable aerial seeding areas, and the corresponding small size of potential projects resulting in economically restrictive seeding projects.

During the 2000-05 FMP period, a total of 10,394 hectares of site preparation were reported in both salvage and regular harvest areas, achieving 102% of the FMP forecast level, as amended for salvage harvest amendments.

The total artificial regeneration program on regular harvest area was slightly higher than forecast due to the larger than forecast planting program. The result was an artificial regeneration to natural regeneration ratio of 56:44 while the forecast approximated a ratio of 50:50.

During the 2000-05 FMP period, a total of 4,505 hectares of aerial tending was completed. This is below (48%) the forecast level due to the following reasons:

- To address specific concerns identified by Whitesand First Nation.
- Late start-up of aerial tending operations during 2003-04 and 2004-05AWS periods.
- Deferral of treatment of areas due to the establishment of temporary camps within or adjacent to the blocks.
- Cost considerations associated with areas identified, competition to be controlled, and the size, type and distribution of crop trees within areas identified for treatment.

Discussions with the Whitesand First Nation have been on-going to address concerns regarding future aerial application of herbicides. The areas not treated during the 2003-04 and 2004-05 AWS periods due to the late start-up, were identified for treatment in the 2005-06 AWS.

During the 2000-05 FMP period, a total of 402 hectares of manual tending was completed. This is below (35%) the FMP forecast level for a number of reasons, including:

- The limited opportunity presented by the narrow window of operation for manual tending.
- Shortages in suitably qualified individuals to complete the project for Whitesand Forestry.
- Cost considerations associated with areas identified, competition to be controlled, and the size, type and distribution of crop trees within areas identified for treatment. Alternative treatments (basal bark application or foliar application) generally produce better results and are more cost effective than manual.

During the 2000-05 FMP period, a total of 532 hectares of ground tending (including both backpack spray and basal bark) was completed, above (233%) the FMP forecast level for a number of reasons, including:

- The wider window of operation for basal bark tending (which can be completed at anytime) relative to the narrower window for manual tending and backpack spray.
- The ground tending treatments (basal bark application or foliar application) generally produce better results and are more cost effective than manual.

During the 2000-05 FMP period, a total of 414 hectares of pre-commercial thinning, below (28%) the forecast level due to:

- The 2001 storm severely damaged many of the candidate jack pine aerial seeding areas.
- No candidate poplar stands were verified by the experts at Longlac Wood Industries.

Overall, the tending program was well below (48%) the forecast level due to the low levels of aerial tending and the limited thinning as outlined above.

#### 4.2.2 The Expenditures on Renewal and Tending Operations

During the 2000-05 FMP period, crown revenues, forest renewal trust fund revenues, and forestry futures trust fund revenues were all well below the FMP forecast levels, due primarily to reasons related to the 2001 storm, including:

- The storm severely damaged stands and affected yields. Many of the planned harvest areas became salvage harvest operations with reductions in stumpage, reducing crown revenues.
- The emphasis on salvage harvest operations had reductions in salvage and zero renewal or forestry futures fees, reducing the payments to these sources.
- Fluctuations of stumpage rates confounds comparison to the FMP forecast.

#### 4.2.3 Silvicultural Effectiveness of Renewal and Tending Operations

During the 2000-05 FMP period, 5,124 hectares were assessed and found to be successfully regenerated. This is 30% of the forecast level identified in the FMP (16,949 hectares as per FMP-28). Less area was surveyed and found to be successfully regenerated due to:

- The limited amount of helicopter surveys in the fall of 2003 and 2004 to identify candidate tending areas. The aerial tending program was not completed in 2003-04 or 2004-05, resulting in less need to identify additional tending areas for 2004-05. Regeneration assessment is generally conducted in conjunction with candidate tending area surveys.
- The limited amount of aerial tending resulted in areas continuing to require tending treatment prior to being assessed for regeneration success.
- The timing of regeneration assessment. Starting in 2000-01, the timing of regeneration assessments has been based on the silvicultural ground rules outlined in the Armstrong Forest 2000-2020 Forest Management Plan, which indicates regeneration assessment timing based on future forest unit. Assessments in previous AWS periods were conducted primarily five years post establishment for all forest units. Therefore, many of the areas scheduled for assessment had been assessed in previous AWS periods.
- The blowdown/snow damage in 2001 resulted in the requirement to assess a large geographic area for potential retreatment which limited the resources that could be allocated to regeneration assessment.
- The blowdown/snow damage also resulted in some areas no longer being eligible as successfully regenerated.
- The geographic distribution of areas scheduled for assessment resulted in efficiencies being realized if assessment was delayed.

#### 4.2.4 Harvest and Regeneration Trends

Due to the limited information available for AR-16, harvest and renewal trends are difficult to identify. Trends are also not apparent due to the time frames associated with regeneration assessment as per the Silvicultural Ground Rules (SGRs). This is particularly evident in the spruce forest units which have longer periods between harvest and assessment for regeneration success. It should be noted that a program for monitoring the status of lowland spruce regeneration prior to the formal surveys identified in the SGRs is being implemented on the Armstrong Forest, as outlined in Section 4.4 Independent Forest Audit Action Plans.

As more information becomes available (in future FMP periods), regeneration trends will become more apparent. Based on Table AR-16, preliminary assessment results illustrate a trend towards regeneration of jack pine. This trend is consistent with SFM modeling which shows an increase in the jack pine conifer (PjC) forest unit through time. As outlined in Section 4.2.3 Silvicultural Effectiveness of Renewal and Tending Operations above, considerable assessments are scheduled for 2005-2006. These assessments will provide more data for trend analysis in this table.

#### 4.2.5 Recommendations

Based on the information outlined above, it is recommended that increased assessments of renewal activities be conducted early in the 2005-2010 FMP period to address the backlog of assessments not completed during the 2000-2005 FMP period. These assessments will provide an indication of the success of regeneration efforts on the Armstrong Forest.

In addition, it is recommended that Domtar continue to work with Whitesand First Nation to further develop the mutual understanding of the issues involved with the application of herbicide on the Armstrong Forest. As outlined above, discussions with the Whitesand First Nation are on-going to further address Whitesand concerns centred around the aerial application of herbicides in future AWS periods.

It is recommended that assessments of jack pine seeding be conducted early in the 2005-2010 FMP period to determine pre-commercial thinning potential for later in the FMP period. It is expected that young jack pine stands that were not damaged by the snow and wind storm of October 2001 will be coming on-line for pre-commercial thinning. It is also recommended that assessments be conducted by Longlac Wood Industries to identify potential pre-commercial thinning areas in poplar stands for identification in future FMP periods.

#### 4.3 Review of Forest Modeling Assumptions

During the preparation of the 2000-2020 Forest Management Plan for the Armstrong Forest, a number of assumptions are made to develop the long-term management direction of the Forest. These assumptions are outlined in Section 2.3.5 Strategic Forest Management Model Inputs in the 2000-2025 Forest Management Plan. This section of the Report provides a review of assumptions.

##### 4.3.1 Forest Units

The forest units used during the 2000-05 FMP period were ecologically sound with few changes required. The forest units occupying the most area (representing 81% of the landbase) in the 2000-05 FMP were closely correlated to the regional standard forest units. There was no need to redefine the forest units to the regional standard forest units. The rugged forest units, spruce pine PFR, and other hardwood forest units were essentially unmanaged and it was felt that the large number of forest units (16) that could be simplified (reduced). It is recognized that ecosite classification would improve upon the currently used simple working group divisions, and for future FMP periods, consideration of an ecosite classification scheme should be incorporated into the review of forest units.

##### 4.3.2 Operable and Reserved Landbase

The 2000-05 FMP accumulating future reserves (11% in SFMM) were based on an analysis of planned and actual reserves for the 1990-2000 period. Actual annual report information (11.3% in Table AR-1) closely approximates the accumulating reserve percentage utilized in SFMM. Other points regarding these SFMM inputs in future planning processes are as follows:

- The modeling of harvesting in water quality reserves should be carefully considered. The inclusion of existing wildlife/riparian reserves on the landbase must be considered.
- Consider including forecast reserves in the inventory for inclusion into SFMM.
- A portion of existing caribou calving AOCs should be available for forest management.
- it is anticipated that future modeling exercises will not incorporate bypass as an accumulating reserve in the same manner as forecast in the 2000-2020 FMP.

##### 4.3.3 Conversion of Harvested Areas to Non-Forest Land

Based on sampling conducted for the 2005 FMP, it was found that the amount of roads and landings was actually significantly lower than modeled and the conversion rates were revised to reflect these results for the 2005-10 FMP. Future modeling exercises should consider the following factors (that are not currently taken into consideration):

- Active road rehabilitation around tourism lakes
- Active or natural road rehabilitation in areas of high potential for future caribou habitat
- Incidental road reclamation through site preparation operations
- Natural road regeneration in inaccessible areas
- Increased amount and efficiency of slash disposal, particularly in winter areas

##### 4.3.4 Treatment of Barren and Scattered Areas

In the 2000-2020 FMP, approximately 50,200 hectares were classified as B&S consisting of older cutover, recent cutover, and wildfires since 1990. This area was "accrued" into the database and effectively categorized for modeling. It is anticipated that updates to the planning inventory for future modeling exercises will be based on the Forest Information Manual.

##### 4.3.5 Caribou Mosaic

Based on the 2001 snow /wind storm damage and the subsequent salvage harvesting that occurred in deferred (i.e. B,C,D,or E blocks), the mosaic was reevaluated for the 2005-10 FMP. It is difficult to assess the effects of this "flexible" approach on the caribou population due to the relatively short term of

its application, and the other factors to be considered in population dynamics and estimates. The mosaic should continue to be reevaluated and refined in future FMP periods through the adaptive management approach. The MNR should also consolidate caribou values information into a single location.

#### 4.3.6 Natural Forest Succession

The natural succession rules in the 2000-2020 FMP were developed based on the most up-to-date information and professional expertise available. Since their development, no subsequent work has been conducted on natural forest succession. Testing conducted for the 2005-2025 FMP (see Appendix A1) revealed few anomalies in the planning database to these succession rules. Therefore, the rules developed for the 2000-2020 FMP were adapted for use in the 2005-2025 FMP. Future FMPs should consider any additional science in this area in the development of natural succession rules.

#### 4.3.7 Yield Curves

Based on benchmarking information conducted for the 2005-10 FMP, the yield curves developed for the 2000-05 FMP were effective in forecasting yields from the Armstrong Forest. Reductions in yield (associated with the 2001 snow/wind storm) were considered in the development of yield curves for the 2005-10 FMP, but long-term effects are unclear. Future yield curves should continue to be based upon benchmark information (i.e. actual yields) to account for the damage.

#### 4.3.8 Natural Disturbance Cycles

Future FMP processes should consider all new information (literature) in developing natural disturbance cycles for the managed forest scenarios (with fire suppression). The limited natural disturbances that occurred on the Armstrong Forest through the 2000-2005 FMP period do not contradict the FMP assumptions. The 2001 snow/wind storm was a stand-replacing event in some areas, but in most locations it did not completely deplete the stand. The natural disturbance cycles without suppression activities continue to be applicable, but future FMPs should incorporate the best information available

#### 4.3.9 Silvicultural Inputs

The following points can be made in this regard:

- Based on the technology currently available for harvesting and processing wood, the operability ranges established in the 2000-05 FMP continue to be appropriate.
- Analysis of the funds required to complete the renewal and tending projects on the Armstrong Forest has resulted in a slight increase in renewal rate projections for the 2005-10 FMP.
- Tree planting densities were below the level identified in the FMP, due to the quantity and distribution of natural regeneration on site and anticipated ingress.
- Future forest modeling exercises will need to consider actual tree plant densities.
- The 2000-05 FMP post-renewal succession assumptions were based on an analysis of renewal operations and success, the best information available and reflected the most current professional opinions at the time of development. Further work is still needed to verify and refine, where required, the succession rates outlined in the FMP.

#### 4.3.10 Harvest Flow

The balance of winter to summer logging chances was an important consideration in the 2000-05 FMP and objectives in this regard (reflected in SFMM modeling) were not attained, due to a number of factors (such as weather, market conditions, and the bump-up request). The biological considerations limiting harvest of wetter areas to frozen conditions are exacerbated by timing restrictions outlined in Area of Concern prescriptions to address tourism and caribou concerns. Future FMP modeling must give careful consideration to the balance of winter and summer logging chances, including consideration of timing restrictions to be implemented as part of AOC prescriptions.

#### 4.3.11 Wood Supply

The industrial demand for SPF and poplar from the Forest was not met, due primarily to lower than forecast yields realized (due the salvage harvest operations which accounted for 25% of the total utilization). In addition, the lower poplar utilization can be partially attributed to the limited harvesting of poplar by Whitesand Forestry. The quality, limited market availability, and the economics associated with long haul distances for birch resulted in low utilization and for future FMP periods, additional markets for white birch need to be considered, as required.

### **4.4 Independent Forest Audit Action Plans**

An independent forest audit of forest management on the Armstrong Forest was conducted in September 2001. The audit covered the period from April 1<sup>st</sup>, 1995 to March 31<sup>st</sup>, 2001. A summary report, *An Independent Audit of Forest Management on the Armstrong Forest for the Period 1995 to 2001*, was produced by Callaghan & Associates Inc., the auditing firm, outlining the results of the audit. As outlined in the report, the audit team was satisfied that forest management on the Armstrong Forest was conducted in compliance with the requirements of the *Crown Forest Sustainability Act*, implementation manuals, the Sustainable Forest License, and the audit protocol. The audit report also indicates that, in the opinion of the auditors, the Armstrong Forest is well managed by Domtar Inc. However, the audit report did identify a number of recommendations and suggestions for improvements in forest management activities. Summaries of the recommendations and suggestions are presented in the sections below.

#### 4.4.1 Recommendations

The audit report identified 21 recommendations for improvements in forest management activities. For a complete discussion and background on these recommendations, refer to the audit report. An action plan has been prepared to address these recommendations.

1. The Minister should renew the Sustainable Forest License of the Armstrong Forest.
2. The Local Citizens' Committee representative to the planning team should operate as an impartial liaison between the two.
3. The OMNR should work with local aboriginal communities on improving the native consultation process to meet their unique needs on the Armstrong Forest.
4. The OMNR should work with, and provide additional resources to, the Whitesand First Nation and the community of Collins to improve the collection of native values information.
5. Land allocations for specific wildlife mosaic blocks or core areas should not be withdrawn or deferred in the calculation/determination of the available harvest area. Only lands where forest management operations are specifically excluded, through a land use planning decision or a specific reserve prescription, should be withdrawn from the available forest area.
6. The analysis of management alternatives process and the tables supporting it should be revised to present information more clearly and make the analysis less arbitrary.
7. The OMNR should review its approach to socio-economic impact assessment and the use of the Socio-Economic Impact Model, and the applicability of both to forest management planning.
8. Domtar should continue to work with the Whitesand Band to develop timelines for road rehabilitation, particularly in the Flat Lake area. Roads should normally be rehabilitated between 15 and 40 years after forest operations.

9. The OMNR and Domtar should continue to monitor stand development in the Flat Lake area. If conifer-dominated stands are not adequately regenerating, OMNR and Domtar should work with the Whitesand Band to develop acceptable silvicultural prescriptions.
10. The OMNR should ensure that values were mapped accurately in the forest management plan and the annual work schedule.
11. Roadside slash piles are to be reduced or eliminated on the Armstrong Forest.
12. Domtar should develop operating procedures to minimize site damage for harvesting on lowland black spruce sites.
13. All bridges on the Armstrong Forest are to have the proper approach signs and bridge corner flashings.
14. Domtar and the OMNR should agree on the responsibility for maintaining and, where required, upgrading older water crossings on the Armstrong Forest.
15. Domtar should increase monitoring activities on crossings to ensure they meet all applicable laws and regulations.
16. Domtar should facilitate training for all operators on the Armstrong Forest to ensure that operations comply with all applicable laws, regulations, and standards.
17. Domtar should establish a program to monitor the condition of naturally regenerated sites prior to formal free-to-grow surveys.
18. Annual reports should provide clearer explanations of deviations from planned performance levels.
19. Domtar should take a more active and regular role in monitoring the payments into the Forest Renewal Trust account.
20. The OMNR should revise the white birch commitment from the Armstrong Forest to be consistent with the productive capacity of the forest.
21. Domtar should make available 100% of the available poplar, up to 130,000 cubic metres, to Longlac Wood Industries and/or Kimberley Clark.

#### 4.4.2 Suggestions

In addition to the recommendations outlined above, the audit report identified 4 suggestions for improvements in forest management activities. For a complete discussion and background on these suggestions, refer to the audit report. An action plan has been prepared to address these suggestions.

1. The OMNR and Domtar should simplify the material presented at open houses so that members of the general public can understand it more easily.
2. The OMNR should retain an impartial mediator to help resolve the issues surrounding the development of Road 2000.
3. The OMNR should check the Natural Heritage Information Centre database for rare, vulnerable, or endangered species as part of the development of the 2005 management plan. If such species are found to occur on the Armstrong Forest, they are to be discussed in the plan.
4. The OMNR and Domtar should continue to work towards the identification of marten core areas at Vale Lake and Little Jackfish River.

#### 4.4.3 Status Report

A status report summarizing progress towards completion of the action items required to address the recommendations and suggestions outlined above was prepared in 2005. Virtually all (90%) the action items outlined in the Action Plan have been completed with future tracking required on eight action items.

### **4.5 Assessment of Objective Achievement**

This Section of the Report documents the assessment of the achievement of the management objectives in the 2000-2020 Forest Management Plan for the Armstrong Forest. A total of 17 objectives were developed. Overall, the objectives were thought to be appropriate for the 2000-05 FMP term, but some modifications are warranted to produce more quantifiable targets for future FMP periods.

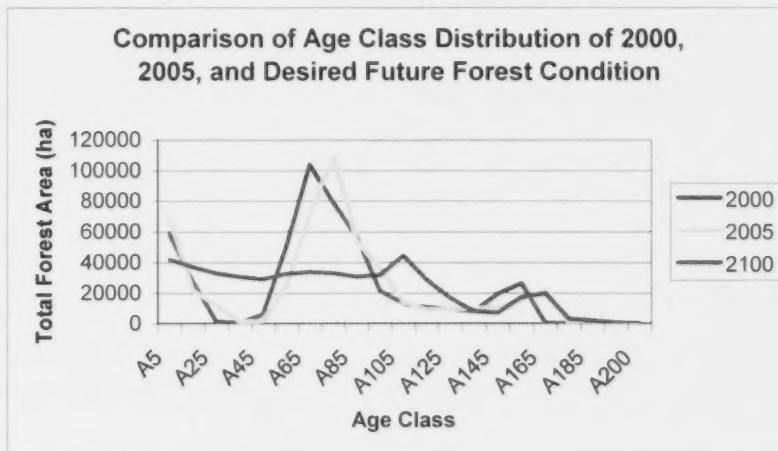
#### 4.5.1 Forest Diversity Objectives

**“To maintain forest diversity within the bounds of natural variation.”**

To assess the progress towards achievement of this objective, two measures were developed, involving age class structure and forest unit composition at the Forest level. The age class distribution has seen minimal change (see the graph below). The changes that have occurred are primarily attributable to ageing with harvesting and the blowdown/snow damage contributing to the increase in the youngest age class. A portion of area in older forest continues to be maintained.

Similarly, the forest unit composition of the Forest has seen minimal change. The roll-up of forest units and the different methods of dealing with young stands in forest modeling have made the trends less clear. Overall, Table RPFO-13 shows some progress towards the desired future forest condition.

As outlined above in Section 4.1 Analysis of Forest Disturbances, during the 2000-05 FMP period there was slight movement away from the frequency distribution of the natural template, primarily due to the disturbances created through salvage harvest of the blowdown/snow damage. The area distribution of disturbances at the end of the 2000-05 FMP period also continue to approximate the natural template area distribution.



**“To protect and/or enhance landscape processes which affect the structure, composition and function of forest ecosystems through minimizing adverse effects on terrestrial and aquatic ecosystems.”**

The strategies for protecting/enhancing landscape processes involved application of the guidelines, and monitoring and reporting in accordance with the Forest Compliance Plan (2000-2005). As outlined in the FMP, the direction provided in the guidelines was considered and incorporated to prevent, minimize or mitigate adverse effects on the physical environment and maintain the productive capacity of managed sites. In addition, a total of 282 industry forest operations compliance inspections were conducted during the 5-year period. Therefore, there has been considerable movement towards attainment of this objective during the FMP period. However, it is suggested that in future FMP periods, this objective be modified to contain more quantifiable targets as measures of achievement.

#### 4.5.2 Provision of Forest Cover Objectives

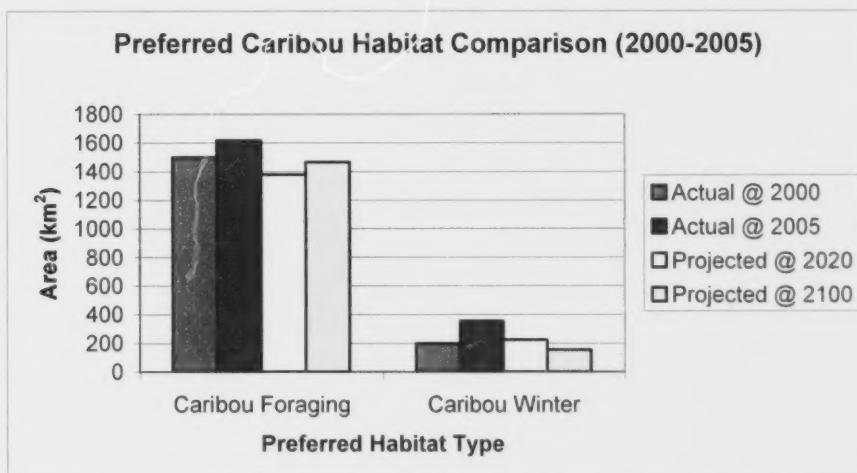
Table RPFO-16 outlines the actual habitat at 2005 and projected habitat over time for selected wildlife species. In general, since 2000, preferred habitat for species that favour older forest is increasing due to ageing of the forest. In addition, preferred habitat for species that favour younger forest is also increasing due to harvesting. There were no dramatic decreases in preferred wildlife habitat for any species between 2000 and 2005. There is no concern with the area of habitat for any of the selected wildlife species.

**“To protect and maintain heron rookeries and nesting sites for bald/golden eagle and osprey.”**

During the preparation of the 2000-05 FMP, three nest sites were identified for protection and received the AOC prescriptions identified in the FMP. These prescriptions were implemented as outlined in the FMP. Two additional nests were identified by the forest industry during operations. One nest was found outside allocations and reported to MNR for verification. Another was found within allocations and an amendment was processed to add the nest to the FMP. Based on this information, this objective was met for known nests. However, the procedure for nests identified during operations needs to be considered during future FMP processes to ensure protection of these values.

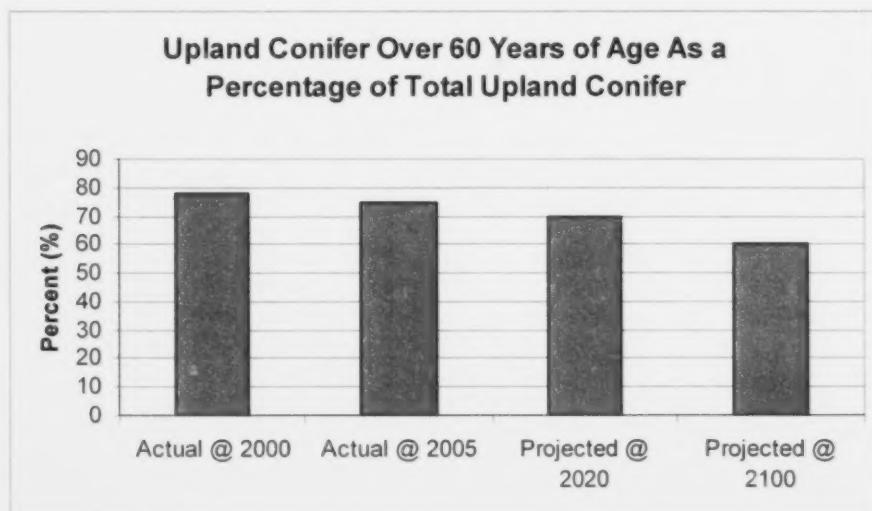
**“To ensure a suitable and sustainable landscape containing adequate year-round caribou habitat north of the caribou line.”**

No specific target levels were identified in the 2000-05 FMP. Spatial habitat supply analysis conducted at year 2000 illustrated that an acceptable distribution of caribou habitat through time was provided. Since the mosaic was subsequently revised to reflect salvage harvesting, the resulting disturbance on the landscape does not match the 2000 FMP forecast and a revised spatial analysis was conducted in the 2005-10 FMP. The resulting distribution of caribou habitat through time was also acceptable.



In addition to the spatial habitat supply analysis, two forms of non-spatial habitat supply analysis were conducted. The first utilized the wildlife habitat suitability matrix in SFMiM to identify the amount of preferred habitat that is available over time. As outlined in the graph below, there is more preferred caribou habitat in 2005 compared to 2000, primarily due to revisions to the habitat suitability matrix and updates to the landbase completed for the preparation of the 2005-2025 FMP.

The second analysis involved the tracking of the amount of upland coniferous forest over 60 years of age in the conventional management zone. As outlined in the graph below, the upland conifer in the conventional caribou management zone decreased between 2000 and 2005, primarily due to the implementation of the 2000-2020 FMP. The graph illustrates movement towards the forecast levels at 2020 and 2010 (DFFC).



**"To maintain in suitable conditions, forest which has the capability to produce marten."**

In the 2000-05 FMP, the amount of suitable habitat in core areas (7.8% at 2000) fell below the 10-20% target outlined in the guidelines due to the age class structure of the forest. At 2005, the forecast amount of suitable habitat in core areas was 7.6% while the calculated actual 2005 suitable habitat in core areas was 9.4% (from the 2005-2025 FMP). The difference can be attributed revised queries to categorize capability and suitability, the use of the Ontario Marten Analyst, and the use of "sub-optimal cores" as described in the 2005-10 FMP. There has been movement towards the 10-20% target.

In addition, as outlined in RPFO-16, preferred pine marten habitat can be monitored in SFMM. Between 2000 and 2005 there was little change in the amount of preferred marten habitat (see table below). Therefore, since the forecast area of preferred marten habitat at 2100 (DFFC) also approximates current levels, progress has been made towards the desired future forest condition.

Area of Preferred Marten Habitat at 2000 (km <sup>2</sup> )	Area of Preferred Marten Habitat at 2005 (km <sup>2</sup> )	Percent Difference	Projected Area of Preferred Marten Habitat at 2100 (km <sup>2</sup> )
1,949	1,939	0%	1,945

At the stand level, harvesting practices were modified to promote the retention of at least 6 live, dead or declining trees per hectare, and where possible, at least two of these exceeding 30 cm dbh. As outlined in the Forest Operations Inspection Reports, these stand level requirements were generally met. For the 2005-10 FMP period, a total of 25 well-spaced trees per hectare as per the *Forest Management Guide for Natural Disturbance Pattern Emulation* will be left on all sites.

**"To ensure the quality of moose habitat is maintained or enhanced."**

Moose habitat related values were identified and protected with AOC prescriptions in the 2000-05 FMP. These prescriptions were implemented and reported on as part of the comprehensive compliance program in the Forest Operations Inspection Reports (FOIR).

Preferred moose habitat was monitored in SFMM (as outlined in RPFO-16). An assessment of changes in preferred habitat is difficult due to changes in the wildlife habitat matrix, particularly for moose foraging habitat. In the 2000-05 FMP, preferred moose foraging habitat was unavailable so marginal habitat was utilized. As outlined in the table below, there has been a decrease in the amount of foraging habitat between 2000 and 2005. However, this is likely confounded by the use of marginal habitat to represent preferred in the 2000 FMP. There has also been an increase in the amount of preferred moose winter habitat between 2000 and 2005 which can be attributed to forest ageing and revisions to the habitat matrix. Since late winter habitat is often the limiting habitat feature for moose, the increased amount of late winter habitat is positive for moose on the Armstrong Forest.

Type of Moose Habitat	Area of Preferred or Marginal Moose Habitat at 2000 (km <sup>2</sup> )	Area of Preferred Moose Habitat at 2005 (km <sup>2</sup> )	Percent Difference	Projected Area of Preferred Marten Habitat at 2100 (km <sup>2</sup> )
Foraging	1,932	1,335	-31%	1,927
Winter	768	1,955	155%	788

**"To ensure the protection and maintenance of water quality and habitat for fisheries resources within watersheds where forest management activities occur."**

During the production of the 2000-2020 FMP, fish habitat and water quality related values were identified and protected with AOC prescriptions. These prescriptions were implemented through the FMP period and reported on in the FOIRs, as part of the compliance program for the Armstrong Forest.

#### 4.5.3 Social and Economic Matters

**"To ensure that the Armstrong Forest is managed in an environmentally sound manner to provide sustainable, economical, and predictable supply of quality wood fibre to user mills sourcing fibre from the Armstrong Forest."**

Over the 5-year term of the FMP, depletion levels approximated 81% of the forecast level in the 2000-2020 FMP for regular harvest areas. Inclusion of the areas identified for salvage harvest through amendment planning resulted in a 104% achievement. Therefore, while all the planned FMP allocations did not get utilized, a comparable area was harvested.

Similarly, total utilization from planned FMP allocations was below FMP forecast levels (67% of the conifer and 43% of the hardwood). Inclusion of the planned salvage volumes areas (through amendment planning) resulted in a total conifer utilization of approximately 89% of the FMP forecast. Therefore, while conifer utilization levels from FMP allocations were below forecast, total conifer utilization levels during the 5-year period approached total forecast levels. Hardwood utilization did not approach forecast levels due to the limited operation in hardwood stands by Whitesand Forestry and the limited birch markets throughout the term of the FMP.

A total of 89% of the conifer forecast and 58% of the hardwood forecast were utilized by area mills. Conifer utilization was slightly below forecast due to the concentration of operations on areas damaged by the 2001 storm (reduced yields). Some mills without directives/commitments received fibre from the Armstrong Forest as a result of economics and the application of fibre exchange agreements. Hardwood utilization by area mills was considerably below forecast levels due to a number of factors, primarily the limited operation of Whitesand Forestry in hardwood stands, and the low quality of the white birch.

Upon review, the implementation of the 2000-05 FMP provided a large contribution to local mills and communities as fibre harvested from the Armstrong Forest flowed to a number of mills located throughout Northwestern Ontario. Through this broad utilization, the Forest has been managed on the principle of maximizing the utilization of all timber harvested for the production of an array of forest products. Conifer fibre was manufactured into a combination of lumber and sawmill byproducts, which were in turn manufactured into linerboard for the production of packaging material. Hardwood fibre generated veneer/flaker grade aspen, hardwood sawlogs, and hardwood pulp. Through this maximization principle, a lower-cost supply of furnish is provided to Buchanan Forest Products sawmills, which in turn, supplies the Norampac linerboard in Red Rock at a competitive rate. This contributes directly to the stability, value and diversification of the local and regional economies.

**“To identify and implement ways of achieving a more equal participation by local Native communities in the benefits provided through forest management planning and activities on the Armstrong Forest and to maintain and protect Native cultural heritage values.”**

During the implementation of the 2000-05 FMP, on-going consultation with Whitesand First Nation was conducted through a number of avenues, including:

- Planning team meetings. – Whitesand First Nation and Whitesand Forestry both had representatives on the planning team for the 2005-2025 Forest Management Plan.
- Community meetings – Whitesand chose to participate in the 2005-2025 Forest Management Plan Native Consultation Program, which involved a number of community meetings. The format of the community meetings was tailored based on the information provided by the Whitesand First Nation and Whitesand Forestry representatives on the planning team (see above).
- Annual meetings to discuss newly identified native values – During the 2000-2005 FMP term, Whitesand First Nation was provided with AWS maps to determine the presence of any newly identified native values. A meeting would be scheduled to discuss the operations, as required.
- Periodic communication with Whitesand First Nation and Whitesand Forestry in the form of informal meetings, telephone discussions, and written correspondence to discuss other forest management planning initiatives, issues or concerns.
- Discussions regarding proposed road destruction activities associated with the protection of remote tourism values – Domtar and Whitesand discussed the issue to develop a mutually beneficial approach in areas around remote tourism lakes identified in the 2000-2005 FMP.
- Discussions regarding proposed road rehabilitation for future caribou habitat – Whitesand was invited to participate in the meetings and field sessions scheduled to discuss the issue and provide input into the development of a methodology for the assessment of natural road regeneration.
- On-going dialogue and information exchange sessions between Whitesand First Nation and Domtar to continue to develop a mutually acceptable approach for tending operations on the Armstrong Forest. These sessions were held on an annual basis and ranged from small group discussions, community meetings, and field sessions. In addition, Whitesand First Nation representatives were invited to participate in helicopter surveys to identify the location of tending blocks in future AWS periods.
- Operational meetings with Whitesand Forestry – During the 2000-2005 FMP term, meetings were conducted with Whitesand Forestry representatives to review the approved AWS, highlighting special and specific operating procedures, conditions, or restrictions. Whitesand Forestry was provided with information required to conduct harvest operations. These meetings would typically occur in the spring, prior to the start-up of operations. However, these meetings were also scheduled throughout the year as required.
- Silvicultural meetings with Whitesand Forestry – During the 2000-2005 FMP term, meetings were conducted with Whitesand Forestry representatives to discuss up-coming renewal and tending activities and potential opportunities for Whitesand Forestry. These meetings would typically occur in the spring, prior to the start-up of operations.

During the 2000-2005 FMP period, on-going consultation with the Community of Collins was conducted through a number of avenues, including:

- Planning team meetings – The Community of Collins had a representative on the planning team for the 2005-2025 Forest Management Plan.
- Community meetings – The Community of Collins chose to participate in the 2005-2025 Forest Management Plan Native Consultation Program, which involved a number of community meetings. The format of the community meetings was tailored based on the information provided by the Community of Collins representative on the planning team (see above).
- The Enhanced Consultation Process – MNR, Domtar and the Community of Collins met periodically (as identified in the Enhanced Consultation Process) to discuss on-going operations and future opportunities.
- Periodic communication with the Community of Collins in the form of informal meetings, telephone discussions, and written correspondence to discuss other forest management planning initiatives, issues or concerns.
- Discussions regarding proposed road rehabilitation for future caribou habitat – The Community of Collins was invited to participate in the meetings and field sessions scheduled to discuss the issue and provide input into the development of a methodology for the assessment of natural road regeneration.
- Armstrong Local Citizens Committee – The Community of Collins has representation on the LCC.

During the 2000-2005 FMP period, a number of harvesting opportunities were provided to Whitesand members, including:

- Over-lapping license areas for softwood and hardwood. As outlined in Section 2.3.2.3 Annual Report of Utilization by Licensee, for the 5-year term of the FMP, Whitesand Forestry harvested a total of 152,453 m<sup>3</sup> of conifer (67% of the 5-year FMP forecast – see AR-4a-2) and 65,173 m<sup>3</sup> of hardwood (18% of the 5-year FMP forecast – see AR-4a-2) from FMP allocations (both regular and salvage). In addition, Whitesand Forestry (through sub-contract to BFPL) harvested 185,360 m<sup>3</sup> of conifer and 26,825 m<sup>3</sup> of hardwood from salvage harvest areas identified through amendment planning.
- Contract arrangements on BFPL license areas. Unfortunately, Whitesand was unable to follow-up on the contract opportunities for most AWS periods. In 2002-2003, through contract arrangements, BFPL was able to provide training opportunities for three Whitesand members. Contract opportunities for Whitesand members were also provided in 2003-2004.
- Direct employment of Whitesand members by BFPL. Throughout the term of the FMP, suitably qualified Whitesand members were employed in the BFPL Armstrong operation. These are discussed under the fourth socio-economic objective below.

During the 2000-2005 FMP period, a number of renewal and tending opportunities were provided to Whitesand members, including:

- Site Preparation – A total of approximately 4,211 hectares of site preparation were completed by the Whitesand First Nation/KBM joint venture, Whitesand Forestry, and Whitesand First Nation during the 2000-2005 FMP period.
- Tree Planting – A total of approximately 6.1 million trees were planted by Whitesand Forestry, Bache Contracting, Silvaworks, and Stanley Cheesequay during the 2000-2005 FMP period.
- Tending – A total of 440 hectares of manual and ground tending treatments were conducted by Whitesand Forestry, Bache Contracting, and a joint Whitesand/Clearwater venture during the 2000-2005 FMP. Additional tending opportunities were also provided but unfortunately could not be completed.
- Pre-commercial Thinning – A total of 258 hectares of pre-commercial thinning was completed by Whitesand Forestry, Bache Contracting, and Gary's Silviculture during the 2000-2005 FMP period.
- Silvicultural Surveys – A total of 1,324 hectares of stocking surveys were completed by Whitesand Forestry in 2000-2001. In addition, during the 2000-2005 FMP term, Whitesand conducted survival plot establishment and remeasurement.

During the 2000-2005 FMP period, harvesting opportunities were provided to community of Collins members, including:

- Direct employment of community of Collins members by BFPL. Throughout the term of the FMP, opportunities existed for suitably qualified community of Collins members to be employed in the BFPL Armstrong operation. Unfortunately, none of the community of Collins members could take advantage of these opportunities.

During the 2000-2005 FMP period, a number of renewal and tending opportunities were provided to community of Collins members, including:

- Tree Planting – A total of approximately 0.3 million trees were planted by John O'Keese and the Community of Collins during the 2000-2005 FMP period.
- Pre-commercial Thinning – A total of 20 hectares of pre-commercial thinning was completed by John O'Keese during the 2000-2005 FMP period.

The identification and protection of native values was conducted through the 2000-2020 FMP process with Area of Concern prescription being prepared for all identified native values in or adjacent to 2000-2005 allocations and included in the Reports on the Protection of Identified Native Values. To address the issue of the protection of newly identified native values, Whitesand and the community of Collins were consulted on an annual basis (as outlined above). When necessary, an amendment was processed to incorporate the new prescription into the FMP. Two newly identified values were incorporated in this manner.

**“To maintain and protect non-Native archaeological sites, cultural landscapes and traditional use sites.”**

No known cultural heritage sites were located within allocations in the 2000-2020 FMP. Therefore, no Area of Concern prescriptions were developed. During the five-year FMP term, no unidentified cultural heritage values were discovered during operations.

**“To provide socio-economic benefits by encouraging opportunities for local employment in a range of forest management related activities, as well as in the service and supply sectors which support these activities, on the Armstrong Forest.”**

Throughout the five-year term of the FMP, forest management activities on the Armstrong Forest provided a wide range of employment opportunities for residents of local communities. This objective was met through the following opportunities:

- Direct employment opportunities in road construction, harvesting, processing, and hauling operations to suitably qualified residents of local communities through Buchanan Forest Products and Whitesand Forestry. Between 2000-2005, the proportion of the BFPL – Armstrong Division workforce ranged between 32% in 2000-2001 and 52% in 2004-2005. In addition, contract harvest arrangements and training opportunities were provided to Whitesand First Nation members throughout the FMP term. Unfortunately, not all of these opportunities could be acted upon by Whitesand members. Whitesand Forestry provided employment opportunities to Whitesand members throughout the FMP term, particularly during the 2000-2001 and 2001-2002 AWS periods, where 16 members were employed by the community-based forest company.
- Owner-operator agreements with local residents in the harvesting and processing phases of harvest operations.
- Contract opportunities to local silvicultural entrepreneurs in stock production, tree plant, site preparation, tending, pre-commercial thinning, cone collection, and silvicultural surveys. Throughout the FMP term, the majority of these silvicultural activities were conducted by local silvicultural entrepreneurs. The only silvicultural projects that did not contain significant local involvement were those projects that required specialized equipment, specifically the aerial seeding, aerial tending, slash pile burning, and jack pine mulching projects.

Harvesting and Silvicultural contractors also utilized local businesses in Armstrong for groceries, accommodations, fuels, etc. throughout the 2000-2005 FMP term.

**“To provide social and economic benefits by providing opportunities for remote commercial tourism and remote Crown land recreation on the Armstrong Forest by ensuring that forest management activities are planned and implemented in a manner in which all of these uses can be sustained.”**

**“To provide social and economic benefits by providing opportunities for road-based commercial tourism and road-based Crown land recreation on the Armstrong Forest by ensuring forest management activities are planned and implemented in a manner in which all of these uses can be sustained.”**

**“To provide social and economic benefits by providing opportunities for other commercial Crown land users (i.e. trapping, mineral exploration, baitfishing, etc.) by ensuring that forest management activities are planned and implemented in a manner in which all of these uses can be sustained.”**

These objectives were met through public consultation and the implementation of specific AOC prescriptions. The AOC prescriptions associated with remote tourism, remote crown land recreation, road-based tourism, and road-based recreation are inspected as part of the compliance program for the Armstrong Forest. A total of 282 industry forest operations compliance inspections were conducted during the FMP period.

During the 2000-05 FMP period, on-going communication with the tourism operators occurred through a variety of means (mailouts, planning team meetings, LCC meetings, and direct communication and discussions with individual operators and/or the Armstrong Wilderness Outfitters Association).

To identify the location of summer operating areas to canoeists, maps illustrating the location of summer operating areas were posted at the Armstrong Resources Development Corporation (ARDC) in Armstrong. This information allowed canoeists to incorporate pre-planning of campsites away from summer forest management operations to avoid camping in noisy locations. In addition, a contact person was identified so outfitters that cater to canoeists could be provided with updates on the status of summer operations if they request them.

**“To provide volumes of timber for such uses as fuelwood, building logs and other local or personal uses through a range of mechanisms.”**

To address the demand for fuelwood in the Armstrong area, a number of stands were identified as fuelwood areas through the 5-year FMP period. In addition, storm damaged areas provided ample fuelwood in the Armstrong area during the latter part of the FMP term. Fuelwood/Personal Use Timber harvest was permitted under a Forest Resource License for Fuelwood/Personal Use Timber issued by the MNR Thunder Bay District. Use of the standardized “over-lapping agreement” developed during the 1999-2000 AWS period, outlining the relationship and legal obligations of the prime licensee and the over-lapping licensee for the harvesting of personal use timber from the Armstrong Forest simplified the process. A total of 124 m<sup>3</sup> of fuelwood were utilized for personal and commercial means through this process. An additional 48 m<sup>3</sup> of personal use timber were also utilized through this process.

**“To ensure meaningful consultation, through open meetings with local communities, on issues which affect the social and economic health of that community.”**

During the five-year FMP term, this objective was met through a variety of means, including, but not limited to:

- The posting of AWS maps at the Armstrong Resources Development Corporation (ARDC) in Armstrong outlining the scheduled activities for each AWS year. These activities would include a contact person for additional information related to forest management planning.

- The presentation of forest management activities, particularly salvage amendment areas, to the community as the need arose.
- Bulk mailouts of forest management planning related events, including information centres, review periods, and open meetings.
- The open invitation of community members to LCC meetings with agenda items of specific concern to the community (e.g. AWS presentation, road link amendment, etc.).
- The presentation and discussion of issues at the LCC through the presentation of issues to the committee by LCC members.

These means were effective in providing opportunities for people in local communities to express their concerns and comments on issues related to forest management. It is expected that these strategies will continue to be built into the public consultation process for the Armstrong Forest. However, it is not felt that a separate objective is required to meet the specific needs of the local communities for consultation on forest management issues.

#### 4.5.4 Silviculture

**“To optimize forest renewal and tending and maintain/enhance the long-term productivity of the forest in an environmentally sound manner, by combining current silvicultural knowledge, information and technology.”**

Overall, the renewal program was slightly larger than planned, primarily due to the 2001 snow/wind storm and the related salvage harvest operations and remedial work completed. The tending program was significantly below planned, primarily due to the low levels of aerial tending and pre-commercial thinning. The renewal program is on track to produce the desired results, however, it is recognized that additional tending is required to produce the desired future forest condition. Domtar will continue to work with Whitesand to develop a mutually acceptable approach to tending on the Armstrong Forest.

### **4.6 Determination of Sustainability**

Table RPFO-18 identifies the total productive crown forest area by working group. The dominant working group on the forest is black spruce (Sb) with white spruce, balsam poplar and cedar working group stands being relatively rare on the Armstrong Forest.

Table RPFO-18 also identifies the percent of the Available Harvest Area (AHA) actually utilized by forest unit. A considerable portion of the 2000-05 FMP harvest area was classified as salvage and additional area was salvaged through amendment planning. Therefore, the percent of the AHA utilized is higher than identified in RPFO-18 (see AR-1a). When all harvesting on the forest during the 2000-2005 FMP period is considered, the BfM, PjC, PjM, SpC, SpL, and SpM forest units have greater than 100% utilization. Since the additional areas were salvage harvested, consideration of these areas was given in the development of modeling for the 2000-2020 FMP through the inclusion of natural depletions. The Ocl, Spp, PoH, and BwM have below 100% utilization. The relatively limited harvesting in the PoH forest unit by Whitesand Forestry resulted in a lower harvest area. It is expected that utilization of poplar will increase in future FMP periods. Birch markets continued to be limited during the FMP period, resulting in the low percentage of area utilized in the BwM forest unit. As outlined in the 2005-2025 FMP, this forest unit is continuing to be allocated with the expectation BwM stands will be harvested.

The ratio of riparian reserve area (measured in hectares) to length of shoreline (measured in kilometers) adjacent to timber harvesting activity is calculated to be 5.9 ha/km. The reserve area was taken directly from the reserve area reported in the 2000-2005 Annual Reports. The length of shoreline was calculated utilizing a 100 metre buffer on the reported reserves to select sections of lake and stream shorelines. These shorelines were visually verified and a total length of 327 km was calculated.

Based on the actual volume utilized by area mills and the silvicultural investments made during the 2000-05 FMP term, the implementation of the FMP contributed \$39.3 million to the economy.

Both native communities on the Armstrong Forest (Whitesand and the community of Collins) chose to participate in the Native Consultation Process. A specific Native Communities and Values objective was developed in the 2000-05 FMP and met through a number of initiatives.

Approximately 116% of the forecasted silvicultural budget was actually received. More silvicultural spending was conducted due to the increased level of activity resulting from renewal of salvage harvest areas and damaged jack pine regeneration through the Forestry Futures Trust.

Table RPFO-18 also provides a ranking of the effectiveness of the Local Citizens Committee (LCC) based on a self-assessment questionnaire. The result (6.8 on a scale of 1-10) is based on the average of six respondents to the survey. The results were quite variable, ranging from 3.8 to 8.7. The items identified of particular concern to LCC members included:

- Participation of the LCC in the development of objectives and strategies
- Participation of the LCC in the identification, analysis and selection of management alternatives
- Participation of the LCC in the issue resolution process
- Provision of advice to the District Manager when discretionary decisions were made
- Composition of the LCC
- Participation of the LCC in the evaluation of trade-offs to be made during the planning process
- Communication between members of the public and the LCC and the communication of any concerns to the planning team and the District Manager
- Participation of the LCC in insect pest management program

Therefore, based on the selected measurable indicators of forest sustainability presented in RPFO-18 and the limited assessment permitted by only one term of data, considerable progress has been made toward the desired levels for the indicators.

Similarly, considerable progress has been made towards achievement of all management objectives. The current age class and forest unit composition of the Armstrong Forest and the long-term nature of the objectives result in limited movement toward achievement of some objectives, particularly the Forest Diversity and Provision of Forest Cover objectives. The frequency distribution of disturbances continues to approximate the natural template. However, the blowdown/snow damage salvage resulted in some movement away from the template during the 2000-05 FMP period. Similarly, the area distribution of disturbances also continues to approximate the natural template.

Forest management on the Armstrong Forest is affected by the wide diversity of user groups and interested parties that utilize the Forest. The input of these user groups and interested parties was sought throughout the development of the 2000-05 FMP and many of the concerns were developed into objectives for the FMP. As a result, many objectives are not directly compatible and are the result of a balance of the concerns.

The storm in October 2001 and the outstanding bump-up request throughout the majority of the FMP term resulted in some changes to the areas selected for operations. These changes were consistent with the 1996 Forest Management Planning Manual (FMPM) and with the long-term direction identified in the FMP.

In summary, it is felt that the implementation of the 2000-2005 operations, provided for the sustainability of the Armstrong Forest.

#### 4.6.1 Social and Economic Review

The social and economic description prepared for the 2005-10 FMP is the most up-to-date summary available. Therefore, refer to the 2005-10 FMP for a complete social and economic description for the Armstrong Forest. The following summary of changes from the description in the 2000-05 Forest Management Plan has been prepared by MNR.

## Social and Economic Summary

The table below summarizes the demographic information comparing 2000 to 2005.

Indicator	Social and Economic Indicators								
	NWR			Nipigon			Thunder Bay		
2000	2005	Difference	2000	2005	Difference	2000	2005	Difference	
Population	233,370	224,291	-9,079	4,555	5,662	1,107	121,810	114,878	-6,932
Employment Rates (%)	91.0	90.8	-0.2	93.0	87.9	-5.1	90.0	91.5	1.5
Labour Force (%)	120,035	113,063	-6,972	2,475	3,065	590	64,260	58,675	-5,585
Average Incomes	\$23,707	\$28,830	5,123	\$30,507	\$28,687	-1,820	\$24,945	\$30,623	\$5,678
Housing Prices	\$101,822	\$119,140	17,318	\$77,597	\$90,282	12,685	\$97,325	\$142,601	\$45,276
Forestry Portion of Labour Force (%)	24.3	12.2	-12.1	92.9	31.7	-61.2	17.5	7.8	-9.7
Migration: movers (5 yr) (%)	42.0	34.5	-7.5	42.0	38.5	-3.5	42.0	31.5	-10.5
Migration: non-movers (5 yr) (%)	58	65.5	7.5	58	61.5	3.5	58	69.5	11.5
Volume SPF (m <sup>3</sup> )				360,000	316,944	-43,056			
Volume Hwd (m <sup>3</sup> )				156,000	94,354	-61,646			

### Population

On the whole, the population of the region has dropped approximately 15,000 residents and 10,000 members of the labour force. The population is not completely stable with high migration levels: approximately 40% of the population has moved in the last five years. However, over the five year period of the plan, the employment rates in the region decreased only a small amount. Specifically, Nipigon had a population and labour force increase, yet the employment rate decreased approximately 5%. In Thunder Bay, the population is down approximately 7,000 residents, the labour force is down almost as much yet the employment rate is up slightly.

### Income

Average incomes, in general, are up across the region, including the District of Thunder Bay, but are down in the Nipigon District. On the other hand, the price of housing is up consistently across the region. Houses in Nipigon follow the regional trend and are up in value approximately \$12,000 while houses in Thunder Bay are up substantially: approximately \$45,000.

### Employment

As stated above, on average, the employment rate across the region has remained stable; however, in Nipigon it has dropped approximately 5% while in Thunder Bay it has risen approximately 1.5%. With respect to the forestry sector employment as a percentage of the workforce, the percentage is down across the region. Nipigon was greatly impacted with a 60% reduction in the percentage of employed people working in the forestry sector. Thunder Bay was slightly lower than the regional average with a reduction of 10%.

## Industrial Impact

Across the Region, there have been several mill closures and line reductions over the last five years. In Nipigon, Neenah Paper in Terrace Bay reduced its output by one machine. Norampac in Red Rock had a similar reduction in productive output. In Thunder Bay, Bowater Canada inc. also reduced its output by shutting down a pulp machine. No new productive capacity has been added to the users of fibre from the Armstrong forest since Buchanan Northern Hardwoods opened up at the beginning of the 2000 FMP. Harvest volumes for the 2000-2005 period were predicted to be 360,000 m<sup>3</sup> of spruce/pin/fir and 160,000 m<sup>3</sup> of aspen/birch. The actual average volume realized from the forest was 317,000m<sup>3</sup> of spruce/pine/fir and 95,000 m<sup>3</sup> of aspen/birch; quite a reduction from the forecasted volumes.

## Summary

While the volumes realized from the Armstrong forest are significantly reduced from what was forecast, it would be difficult to attribute the reduction in employment and manufacturing capability to this reduction. Factors such as the high value of the Canadian dollar, high energy prices, and poor weather conditions have also added to the uncertainty in the forest industry.

### 4.6.2 Recommendations

Based on the analyses presented in this Annual Report, the following recommendations should be considered in future FMP processes:

- While it is recognized that natural disturbance template development and analysis methods have been refined over the last few years which may result in different targets, based on the frequency distribution presented in Section 4.1, Analysis of Forest Disturbances, future plan processes should endeavour to create fewer small disturbances and more larger disturbances (particularly in the 2500-5000 hectare size class).
- As outlined in Section 4.2 Review of Renewal and Tending Activities, discussions should continue with Whitesand First Nation to develop a mutually acceptable approach to tending on the Armstrong Forest to ensure a continuance of an appropriate mixture of forest cover compositions across the Armstrong Forest.
- As outlined in Section 4.2 Review of Renewal and Tending Activities, increased assessments of renewal activities should be conducted early in the 2005-2010 FMP period to address the backlog of assessments not completed during the 2000-2005 FMP period. These assessments will provide an indication of the success of regeneration efforts on the Armstrong Forest.
- As outlined in Section 4.2 Review of Renewal and Tending Activities, assessments of jack pine seeding should be conducted early in the 2005-2010 FMP period to determine pre-commercial thinning potential for later in the FMP period. It is expected that young jack pine stands that were not damaged by the snow and wind storm of October 2001 will be coming on-line for pre-commercial thinning.
- As outlined in Section 4.2 Review of Renewal and Tending Activities, assessments should be conducted by Longlac Wood Industries to identify potential pre-commercial thinning areas in poplar stands for identification in future FMP periods.
- As outlined in Section 4.3 Review of Modeling Assumptions, future plan processes should consider incorporation of an ecosite classification scheme into the definition of forest units.
- As outlined in Section 4.3 Review of Modeling Assumptions, future plan processes should carefully consider the modeling of harvesting in water quality reserves given the issues (primarily concerns expressed by Whitesand trappers and the lack of information on fish habitat and fish communities). In addition, values collection where there is a lack of information on fish habitat and fish communities is required to fully address the concerns of the Whitesand trappers.
- As outlined in Section 4.3 Review of Modeling Assumptions, future plan processes should consider the inclusion of existing wildlife/riparian reserves on the landbase in SFMM and including forecast reserves in the inventory for inclusion into SFMM. The result would more closely approximate the distribution of these reserves by sub-unit, forest unit and age class. This would also eliminate the need to accumulate reserves into the future in the SFM model.

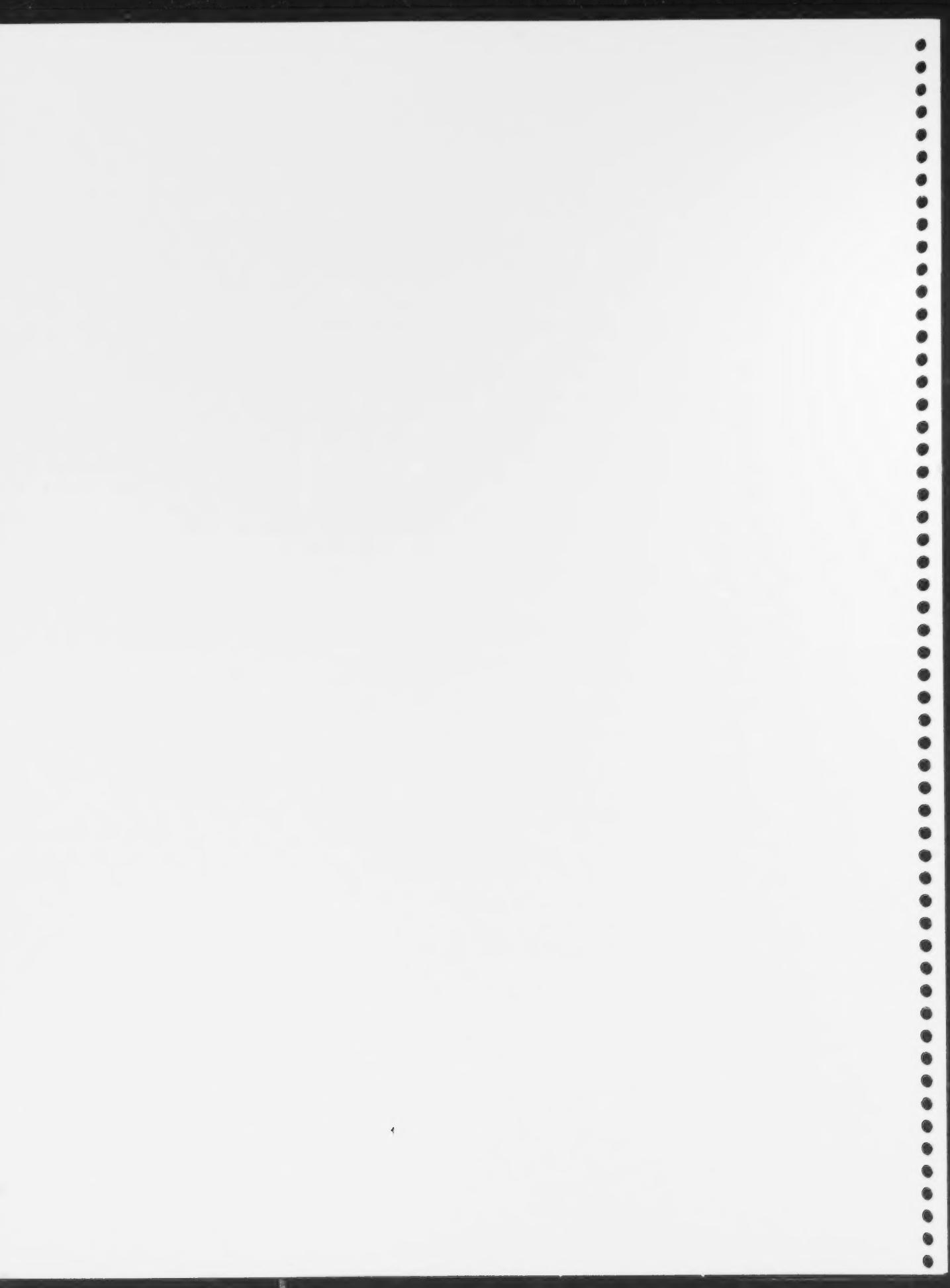
- As outlined in Section 4.3 Review of Modeling Assumptions, future modeling exercises should model a portion of the one kilometer caribou calving areas of concern as being available for forest management.
- As outlined in Section 4.3 Review of Modeling Assumptions, an assessment of the modeling inputs to account for conversion to roads and landings should consider active road rehabilitation around tourism lakes, active or natural road rehabilitation in areas of high potential for future caribou habitat, incidental road reclamation through site preparation operations, natural road regeneration, and increased amount and efficiency of slash disposal.
- As discussed in Section 4.3 Review of Modeling Assumptions, it is suggested that the mosaic continue to be reevaluated and refined in future FMP periods through the adaptive management approach as the understanding of caribou habitat and behaviour increases. It is also suggested that work be conducted by MNR to consolidate caribou values information into a single location for use in future FMP planning exercises.
- As discussed in Section 4.3 Review of Modeling Assumptions, future FMP processes should consider any additional science in this area in the development of natural succession rules and natural disturbance cycles.
- As discussed in Section 4.3 Review of Modeling Assumptions, consideration of the effects of the October 2001 snow and wind storm needs to be continued in future FMP processes.
- For future FMP periods, additional markets for white birch need to be considered, as required. However, it is anticipated that Buchanan Northern Hardwood Inc. will utilize all the sawlog quality birch from the Forest.
- As outlined in Section 4.5 Assessment of Objective Achievement, the procedure for nests identified during operations needs to be considered during future FMP processes to ensure protection of these values.
- As discussed in Section 4.5 Assessment of Objective Achievement future FMP processes should consider some modifications to the FMP objectives to produce more quantifiable targets for future FMP periods.
- As outlined in Section 4.6 Determination of Sustainability, discussions should occur with the LCC to determine the specific nature of their concerns with respect to their effectiveness and collectively identify steps to improve on the effectiveness of the LCC in future FMP processes.

Based on the analyses presented in this Annual Report, the long-term management direction outlined in the 2000-2020 Forest Management Plan is appropriate and should largely be maintained in future FMP processes with consideration of the specific recommendations outlined above.

Armstrong Forest – Independent Forest Audit Report  
Comparison and Trend Analysis of Planned versus Actual Forest Operations Report

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**Appendix B**  
**Audit Team Members and Qualifications**

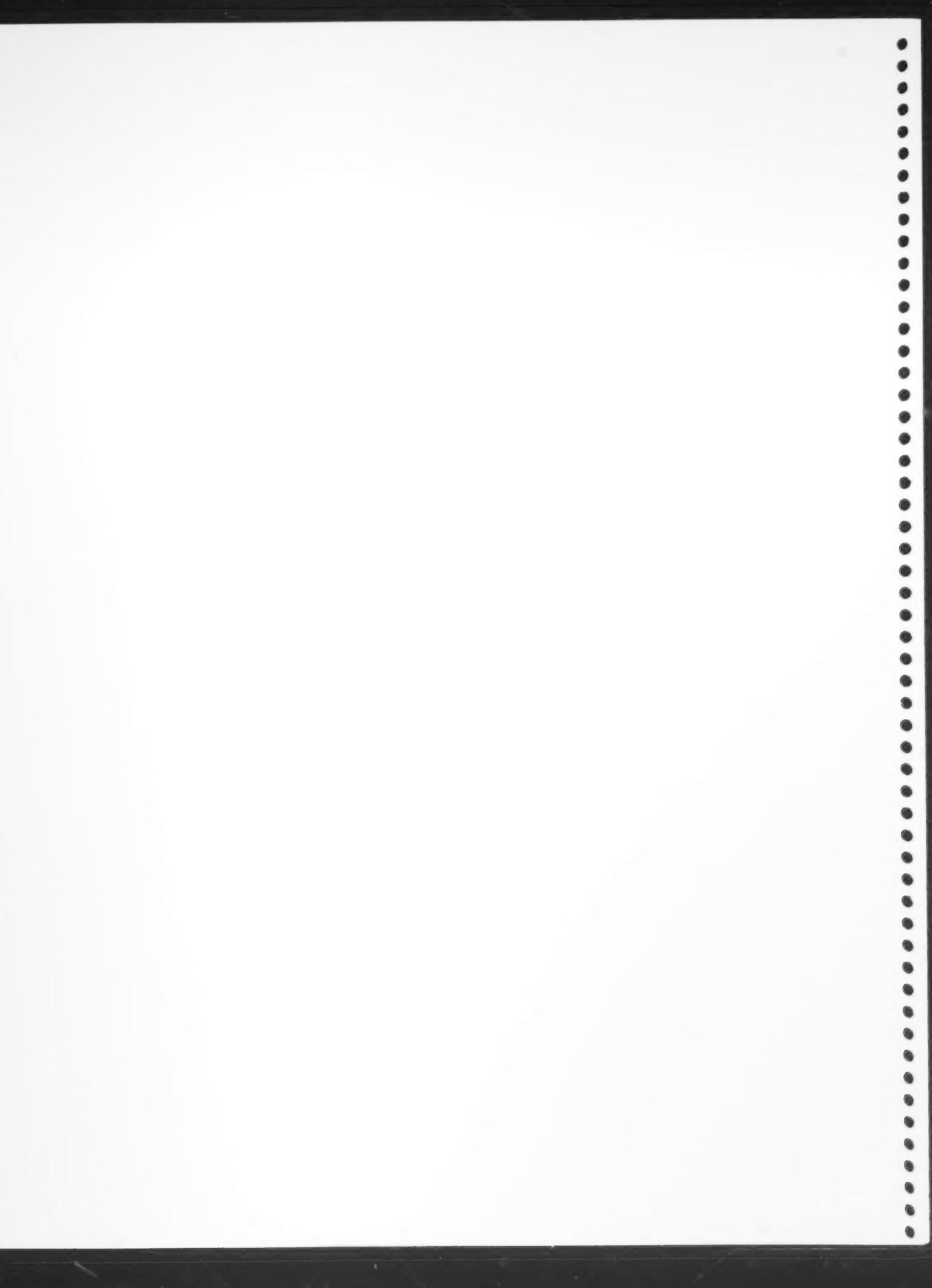


## Audit Team Members and Qualifications

Name	Role	Responsibilities	Credentials
<b>Mr. Herb Bax</b>	Lead Auditor	<ul style="list-style-type: none"> <li>Overall audit coordination</li> <li>Oversee activities of audit team members</li> <li>Review requirements and contractual obligations</li> <li>Lead review of achievement of management objectives and forest sustainability</li> <li>Lead audit report preparation</li> </ul>	R.P.F.; CF/CFA, CEA (SFM), EMS (LA); completed over 115 audits across Ontario, Canada and the United States over the past 33 years; worked on 52 IFAs and/or Forest Management Agreement reviews over the previous fifteen years; over the past eight years has participated in over 90 ISO 14001 Environmental Management System pre-assessments and registration and surveillance audits.
<b>Mr. Laird Van Damme</b>	Harvesting Operations Auditor	<ul style="list-style-type: none"> <li>Assess harvest planning and implementation</li> <li>Review compliance program planning and implementation</li> <li>Assist in assessment of achievement of management objectives and forest sustainability</li> </ul>	R.P.F.; M.Sc.F.; adjunct professor at Lakehead University; completed 12 IFAs as silviculture/harvesting auditor and 2 IFAs as lead auditor; audited CFS Model Forest Program Phase 2; completed several ISO/SFI audits; author of five management plans, several book chapters, peer reviewed journal articles and numerous technical reports.
<b>Mr. Peter Higgelke</b>	Wildlife/Ecology Auditor	<ul style="list-style-type: none"> <li>Review and inspect AOC documentation and practices</li> <li>Review and inspect aspects of forest management related to environmental practices, values and wildlife protection</li> <li>Review access planning and implementation</li> <li>Assist in assessment of achievement of management objectives and forest sustainability</li> </ul>	R.P.F.; M.Sc.F.; wildlife auditor for one FMA Review and five IFAs; harvesting or silvicultural auditor for four IFAs; and planning auditor for one IFA.
<b>Mr. Brad Chaulk</b>	Silviculture Operations Auditor	<ul style="list-style-type: none"> <li>Review and inspect silvicultural practices and related documentation</li> <li>Assist in assessment of achievement of management objectives and forest sustainability</li> </ul>	R.P.F.; 13 years of experience in the forestry sector; head of the Technical Services Division at KBM Forestry Consultants Inc.; member of six Independent Forest Audit teams; currently the plan author for the Black Sturgeon Forest 2006 to 2026 FMP and the lead author of the Silvicultural Ground Rules for the Dog River-Matawin Forest 2005-2025 FMP.
<b>Mr. Dave West</b>	Forest Management Planning Auditor	<ul style="list-style-type: none"> <li>Planning requirements related to public participation and planning team activities</li> <li>Review RPFO</li> <li>Assist in assessment of achievement of management objectives and forest sustainability</li> </ul>	R.P.F.; 24 years of experience with forest industry in Ontario; Fifteen years of planning experience on seven management units across Northwestern Ontario.

Name	Role	Responsibilities	Credentials
<b>Ms. Mary Ann Seabrook</b>	First Nations Auditor	<ul style="list-style-type: none"> <li>• Consultation with local First Nations</li> <li>• Review First Nation consultation in forest management planning.</li> <li>• Review negotiations associated with T&amp;C 77.</li> </ul>	Business Dipl.; of Ojibway descent and a member of the Red Rock Indian Band; a diverse social background with over 25 years experience working with various Aboriginal organizations and government; Native Auditor on four IFAs and one FSC audit.
<b>Mr. Keith Hautala</b>	SFMM Auditor	<ul style="list-style-type: none"> <li>• Review the long-term strategic planning in the SFMM cases for the 1999-2004 FMP</li> <li>• Assist in assessment of achievement of management objectives and forest sustainability</li> </ul>	M.Sc.F.; post-graduate degree studying spatial habitat modeling; analyst to planning teams within Ontario and Manitoba with respect to forest inventory analysis, aspatial and spatial forest planning, and wildlife habitat analysis; formal training in SFMM and Patchworks models; member of four IFA teams.
<b>Ms. Terri Dawyd</b>	Secretariat	<ul style="list-style-type: none"> <li>• Review documentation and practices related to the forest management planning process and public participation</li> <li>• Coordinate document distribution and logistics and audit report preparation</li> </ul>	H.B.Sc.F. (candidate); worked with MNR and contractors on various forestry projects in Northern Ontario; implemented program to increase employment opportunities for Aboriginal people in the forest sector; organized information sessions and task meetings; has worked on two IFA teams.

**Appendix C**  
**Independent Forest Audit Guiding Principles**



**Independent Forest Audit Guiding Principles****1. Commitment**

Commitment is reflected in vision, mission and policy statements of the company. Vision and mission statements are intended to provide long-term guidance for the organization. Policy statements reflect how the organization's vision and mission will be achieved. These statements must be reflected in the day-to-day operations of the organization.

**2. Public Participation**

The process of sustainable forest planning, implementation and monitoring is conducted in an open consultative fashion, with input from all members of the planning team, Local Citizens Committee, Native groups, and other parties with an interest in the operations of the forest unit.

**3. Forest Management Planning**

The forest management planning process involves the input of a number of individuals and groups to describe the current condition of the forest, the values and benefits to be obtained from the forest, the desired condition of the forest, and the best methods to achieve that goal. Certain minimum standards and procedures have been established upon which all management units are evaluated.

**4. Plan Implementation**

Verification of the actual results of operations in the field compared to the planned operations is required to be able to assess achievement of the plan objectives and compliance with laws and regulations. In conjunction with the review of operations, the reporting tables are tested to ensure accurate results are reported.

**5. System Support**

System support concerns resources and activities needed to support plan implementation so as to achieve the desired objectives. Appropriate control, documentation and reporting procedures must be in place and operational. Planned action should occur at planned times, in planned places and to the planned degree.

**6. Monitoring**

The activities and the effects of these activities in achieving management objectives must be regularly measured and assessed. In particular, the indicators of achievement must be assessed and their effectiveness reviewed.

**7. Achievement of the Management Objectives and Forest Sustainability**

Periodic assessments of the management of the forest unit operations and the forest unit must be made in order to determine whether forest sustainability and other management objectives are being achieved. This includes comparing the actual values of the predetermined indicators against the planned values and assessing the reasons for any significant deviations.

**8. Contractual Obligations**

The licensee must comply with the specific licence requirements.



**Appendix D**  
**List of Acronyms**

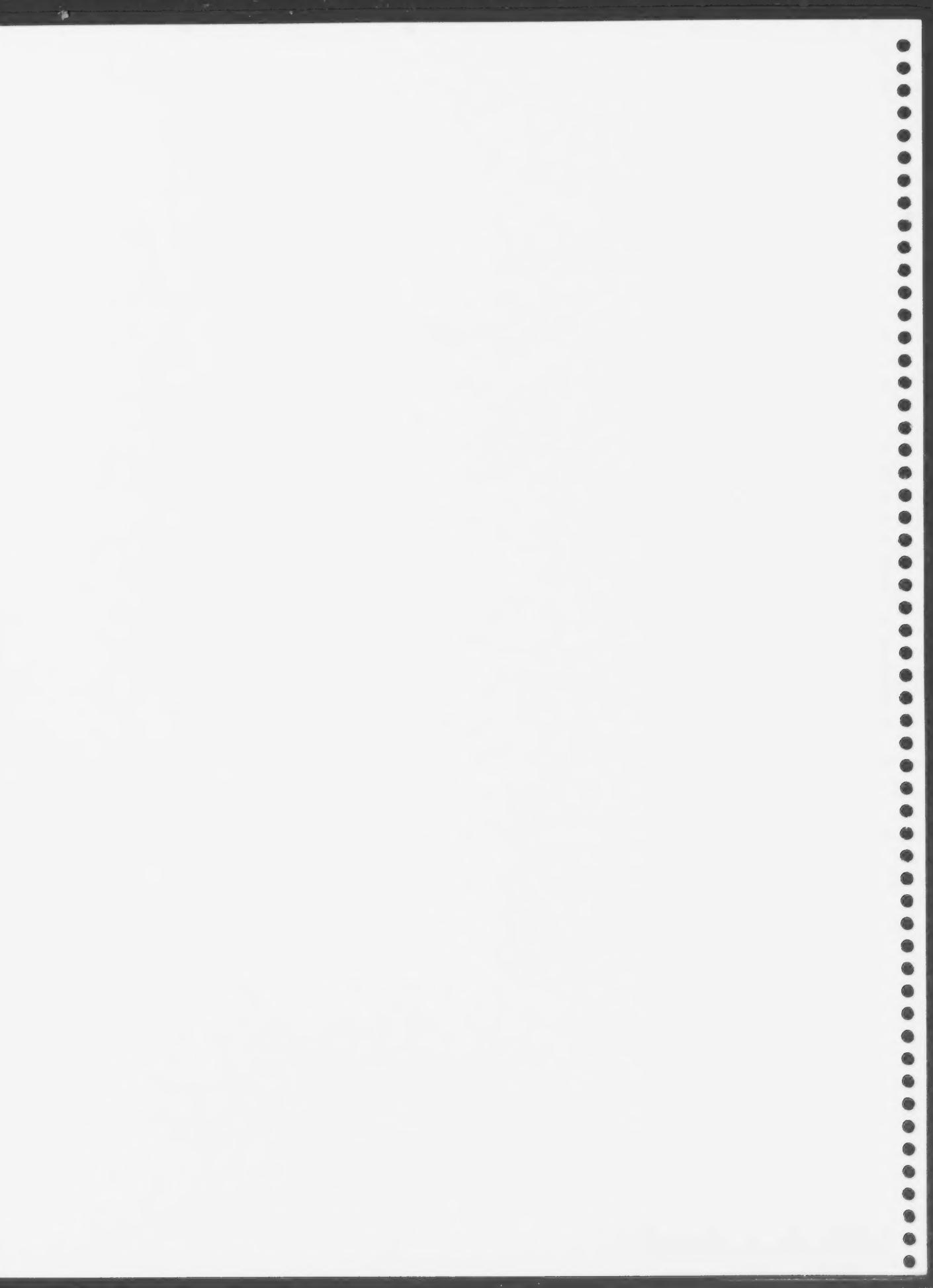


### List of Acronyms

AHA	Available Harvest Area
AOC	Areas of Concern
AR	Annual Report
AWS	Annual Work Schedules
BFOLDS	Boreal Forest Landscape Dynamics Simulator
BFPL	Buchanan Forest Products Ltd.
CEA	Certified Environmental Auditor
CEA(SFM)	Certified Environmental Auditor (Sustainable Forest Management)
CFSA	Crown Forest Sustainability Act
CLAAG	Careful Logging Around Advance Growth
EA	Environmental Assessment
EMS	Environmental Management System
EMS(LA)	Environmental Management System (Lead Auditor)
FFC	Forestry Futures Committee
FIM	Forest Information Manual
FMNCP	Forest Management Native Consultation Process
FMP	Forest Management Plan
FMPM	Forest Management Planning Manual
FOIR	Forest Operation Inspection Report
FOP	Forest Operation Prescription
FRI	Forest Resource Inventory
FRL	Forest Resource Licence
FTG	Free-to-Grow
GIS	Geographic Information System
HPA	High Priority Aspect
IFA	Independent Forest Audit
IFAPP	Independent Forest Audit Process and Protocol
KBM	KBM Forestry Consultants Inc.
LCC	Local Citizens Committee
MAFA	Moose Aquatic Feeding Area
MNR	Ministry of Natural Resources
MOE	Ministry of Environment
NDPEG	Forest Management Guide for Natural Disturbance Pattern Emulation
NRVIS	Natural Resource Values Information System
RBT	Resource-Based Tourism
RHESSys	Regional Hydro-Ecological Simulation System
R.P.F.	Registered Professional Forester
RPFO	Report of Past Forest Operations
RSA	Resource Stewardship Agreement
SEIM	Socio-economic Impact Model
SEM	Silviculture Effectiveness Monitoring
SEV	Statement of Environmental Values
SFL	Sustainable Forest Licence
SFMM	Strategic Forest Management Model
SFM	Sustainable Forest Management
SGR	Silviculture Ground Rule
SMA	Selected Management Alternative
STP	Silvicultural Treatment Package
TREES	Timber Resources Evaluation Systems
Trend Analysis Report	Comparison and Trend Analysis of Planned versus Actual Forest Operations Report



**Appendix E**  
**Summary of Input to Audit Process**



## Summary of Input to Audit Process

### General Public/Other Stakeholders

An advertisement was placed in five local newspapers (the *Wawatay News*, the *Thunder Bay Chronicle Journal*, *Thunder Bay's Source*, the *Nipigon Red Rock Gazette*, and the *Geraldton Times Star*) providing notice of the audit and offering the public an opportunity for input to the audit process. The notice directed the public to contact the Armstrong Forest Local Citizens Committee or the Audit Secretariat with any comments regarding forest management activities on the Armstrong Forest.

### Public Survey

KBM prepared a one-page public survey that was distributed to all organizations and to a random sample of one-third of the individuals listed in the FMP mailing list. In total, 221 surveys were sent out. In addition, the public notice was posted on and available for download from KBM's web site ([www.kbm.on.ca](http://www.kbm.on.ca)). The purpose of the survey was to solicit public input and to provide respondents with an opportunity to identify and discuss any site-specific concerns on the Forest. Three responses were received and are summarized as follows:

1. The respondent provided the opinion that the MNR and Norampac had a lack of understanding of socio-economic issues in the Armstrong Forest which resulted in job opportunities being lost to outside (non-local) contractors, specifically with herbicide application and slash pile burning operations. Therefore, the respondent indicated that the socio-economic objectives in the FMP were not fully met. The respondent also provided the opinion that MNR and Norampac have done a poor job of implementing Term and Condition 77.
  - a. A member of the audit team discussed the concerns with the respondent.
2. The respondent indicated that recreation was their interest in the Armstrong Forest and had never contacted forest managers with comments or concerns during the audit period.
  - a. Comments did not require action by the audit team.
3. The respondent provided the opinion that there has been "little improvement in the commitment from the industry to impact positively on the socio-economics of the area". The respondent also believed that the company's method of implementing Term and Condition 77 resulted in another local contractor going out of business. They further stated that if the company "was to work aggressively with the native and non-native business *jointly* there could be win-win results". The respondent also directed a number of questions to the audit team regarding specific concerns including:
  - a. Achievement of targets for natural and artificial regeneration;
  - b. Level of depletion;
  - c. Management of Barren & Scattered lands;
  - d. Stand typing and classification of residual stands after harvest;
  - e. Determination of FTG status and verification;
  - f. Use of Renewal Trust funds or Forestry Futures funding;
  - g. Regenerating low-stocked stands;
  - h. Management of the "snowdown" event, particularly areas surrounding the community of Armstrong.

The comments were received after the site visit was complete. The audit team will address the concerns in writing when the final audit report is completed.

### Aboriginal Communities

The audit team sent individual letters of invitation to Whitesand First Nation, Namayagoosigagun, Gull Bay First Nation and Aroland First Nation informing them of the IFA of the Armstrong Forest and asking

for their participation. The First Nation Auditor held discussions with the Chiefs or community representatives of two of the four communities. In-person meetings were held with Whitesand First Nation and Namayagoosigagun. Gull Bay First Nation and Aroland First Nation did not respond to the invitation. In total, the First Nation Auditor spent two person-days arranging and meeting with local Aboriginal community representatives. Discussions with Aboriginal representatives led to the development of one suggestion and a best practice.

### **Local Citizens Committee**

The audit team met with the Armstrong Forest Local Citizens Committee at an LCC meeting prior to the site visit. The chairperson also participated in one day of the field audit. The audit team also conducted personal interviews with a number of LCC members during the site visit. Issues brought forward by the LCC have been addressed, where applicable, throughout the report.

### **Overlapping Licensees**

There are two Overlapping Licensees on the Armstrong Forest: Buchanan Forest Products Ltd. (BFPL) and Whitesand Forestry. Representatives of BFPL accompanied the audit team during the field site visits. A member of the audit team met with a representative of BFPL. Whitesand Forestry concerns were discussed with representative of Whitesand First Nation by the First Nation auditor.

### **Commitment Holders**

A questionnaire was distributed to commitment holders on the Armstrong Forest to solicit input and to provide each respondent with an opportunity to identify and discuss any site-specific concerns. Considerable discussions were held with SFL Appendix E commitment holders before, during and after the audit site visit. The issues and concerns raised have been addressed, where applicable, in the report.

### **SFL Holder**

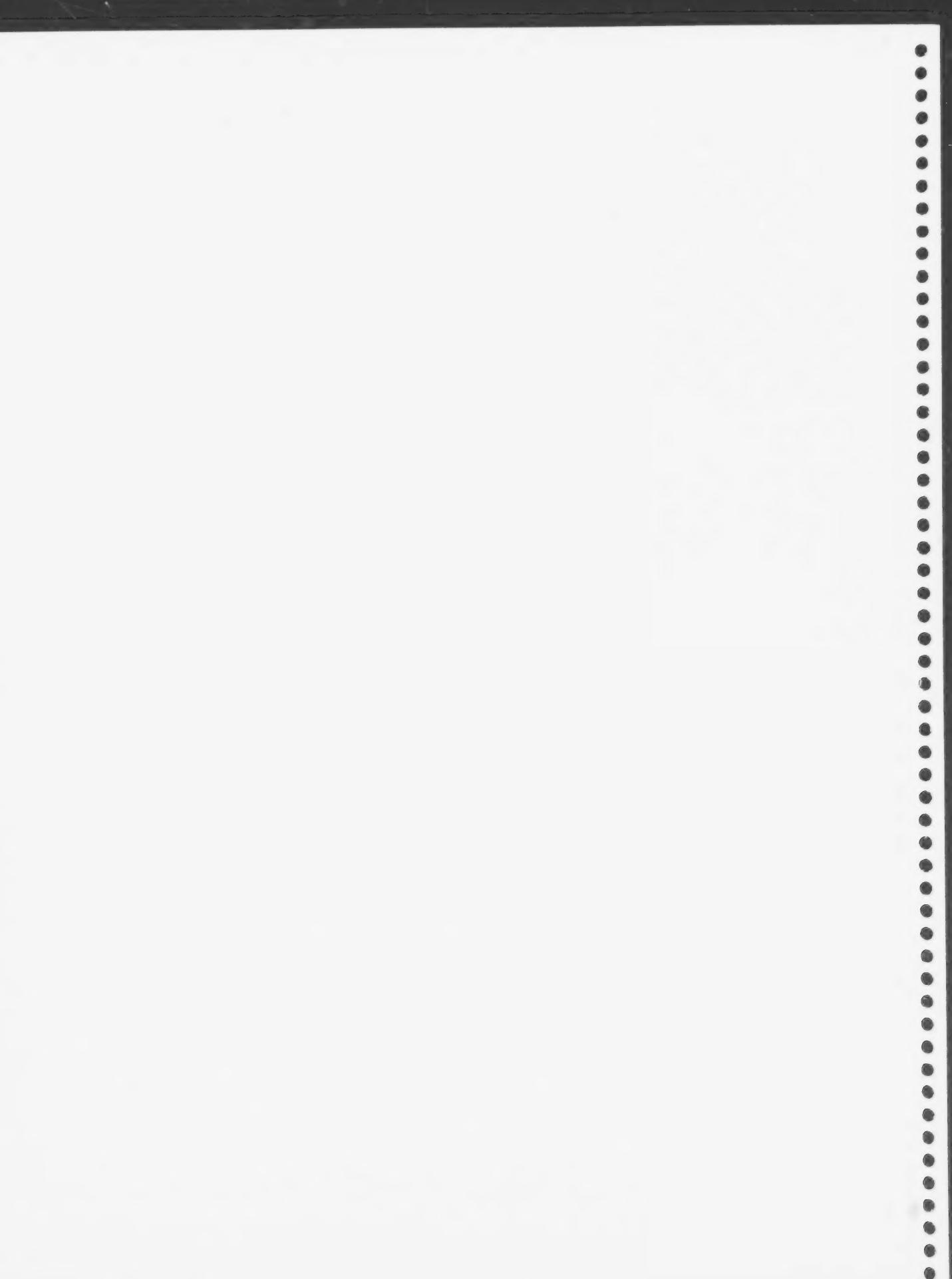
Norampac and Domtar staff provided significant input into the audit. Methods of input included providing background documentation such as the forest management plans, the Trend Analysis Report, maps, and the guiding of field inspections. The audit team recognizes and appreciates that the staff made great efforts to assemble the field binders and organize many aspects of the audit. Numerous interviews were supported with extensive discussion in the field with Norampac and Domtar staff. These discussions formed a significant basis for understanding forest management on the Armstrong Forest.

### **Ministry of Natural Resources**

Ministry of Natural Resources staff provided significant input into the audit through interviews and the preparation of documentation. Representatives from the Thunder Bay District office were present at the pre-audit meeting, the opening and closing meetings, as well as the field site visits. Interviews were conducted with the District Manager, Area Supervisor, Area Forester, Area Biologist, Area Technicians, and GIS staff. An MNR Regional representative also participated in the closing meeting.

The excellent support of the audit process by staff of both Norampac and MNR Thunder Bay District was noted by the audit team.

**Appendix F**  
**Public Survey**



**KBM FORESTRY CONSULTANTS INC.  
2006 INDEPENDENT FOREST AUDIT  
PUBLIC SURVEY**



Every five years, as part of the Province's responsibility for resource management in Ontario, the Ministry of Natural Resources (MNR) contracts firms to evaluate forest management activities on Crown lands. KBM Forestry Consultants Inc. of Thunder Bay, Ontario has been engaged by the MNR this year to conduct an independent forest audit of the Armstrong Forest for the period 2001-2006.

As part of our evaluation, we would appreciate your input as a member of the public with an interest in forest management on the Armstrong Forest. If you have comments related to forestry activities during the five-year period April 1, 2001 to March 31, 2006, please complete and submit this form (please see back of sheet for more information on the audit process).

**KBM provides this opportunity to comment on the Armstrong Forest audit under the authority of Ontario Regulation 160/04 made under the Crown Forest Sustainability Act, 1994. Any personal information provided will be used solely by the audit team as input to the Armstrong Forest Independent Forest Audit. Any questions regarding the collection, use, and retention of the personal information can be directed to Herb Bax, Lead Auditor at 807-345-5445 ext. 230 (email [hbax@kmb.on.ca](mailto:hbax@kmb.on.ca)) or to the company address indicated below**

Name  
(optional)

Tel and/or email:  
(optional)

1. What is your interest in forest management on the Armstrong Forest?

Recreation

Employment (forestry, tourism, etc.)

Conservation

Other

2. Can you identify any specific locations or activities on the Armstrong Forest that illustrate good OR poor management practices, and that the audit team should be aware of in conducting their evaluation?  
Please provide details.

3. Have you ever contacted forest managers with comments or concerns during the 2001-2006 audit period?  
(e.g. local Ministry of Natural Resources, Domtar Inc.)  Yes  No

4. If yes, were you satisfied with the response?  Yes  No

5. Feel free to add any additional comments (use additional sheet if required).

6. Please indicate if we may contact you for more information  Yes  No  
(If Yes ensure that you have provided your contact information above.)

Please mail, email, or fax the completed survey (Attention: Terri Dawyd) to the address/fax number below by  
**Friday June 2, 2006**

The survey can also be accessed through our website, located at [www.kbm.on.ca](http://www.kbm.on.ca)

**Although we cannot respond to everyone, we do take into consideration all comments received.  
THANK YOU IN ADVANCE FOR YOUR INPUT.**

KBM Forestry Consultants Inc  
[tdawyrd@kmb.on.ca](mailto:tdawyrd@kmb.on.ca)

349 Mooney Avenue  
Thunder Bay, ON P7B 5L5  
<http://www.kbm.on.ca>

Tel: (807) 345-5445 ext. 233  
Fax: (807) 345-5858

## INDEPENDENT FOREST AUDIT

### Armstrong Forest

KBM Forestry Consultants Inc. has been retained by the Ministry of Natural Resources (MNR) to conduct an Independent Forest Audit, consistent with the Crown Forestry Sustainability Act, on the management of the Armstrong Forest.

The audit covers the April 1, 2001 to March 31, 2006 operating period. You are invited to comment on the forest management activities on the Armstrong Forest for this period of time. Please mail, email, or fax this form to:

Ms. Terri Dawyd  
KBM Forestry Consultants Inc.  
349 Mooney Ave., Thunder Bay, ON P7B 5L5  
tdawyd@kmb.on.ca  
Tel: (807) 345-5445 ext. 233  
Fax: (807) 345-5858  
Toll-Free: 1-800-465-3001

(All correspondence sent to KBM is confidential)

Alternatively, comments can be made directly to the Local Citizens' Committee Chairperson

Ms. Diane Laybourne, Chair  
Armstrong Forest Local Citizens' Committee  
Box 24, Armstrong, ON P0T 1A0  
aardc@tbaytel.net  
Tel: (807) 583-2080

(The privacy of any information given to the LCC may not necessarily be protected)

Comments must be received by  
Friday, June 2, 2006.



#### Purpose of the Independent Forest Audit

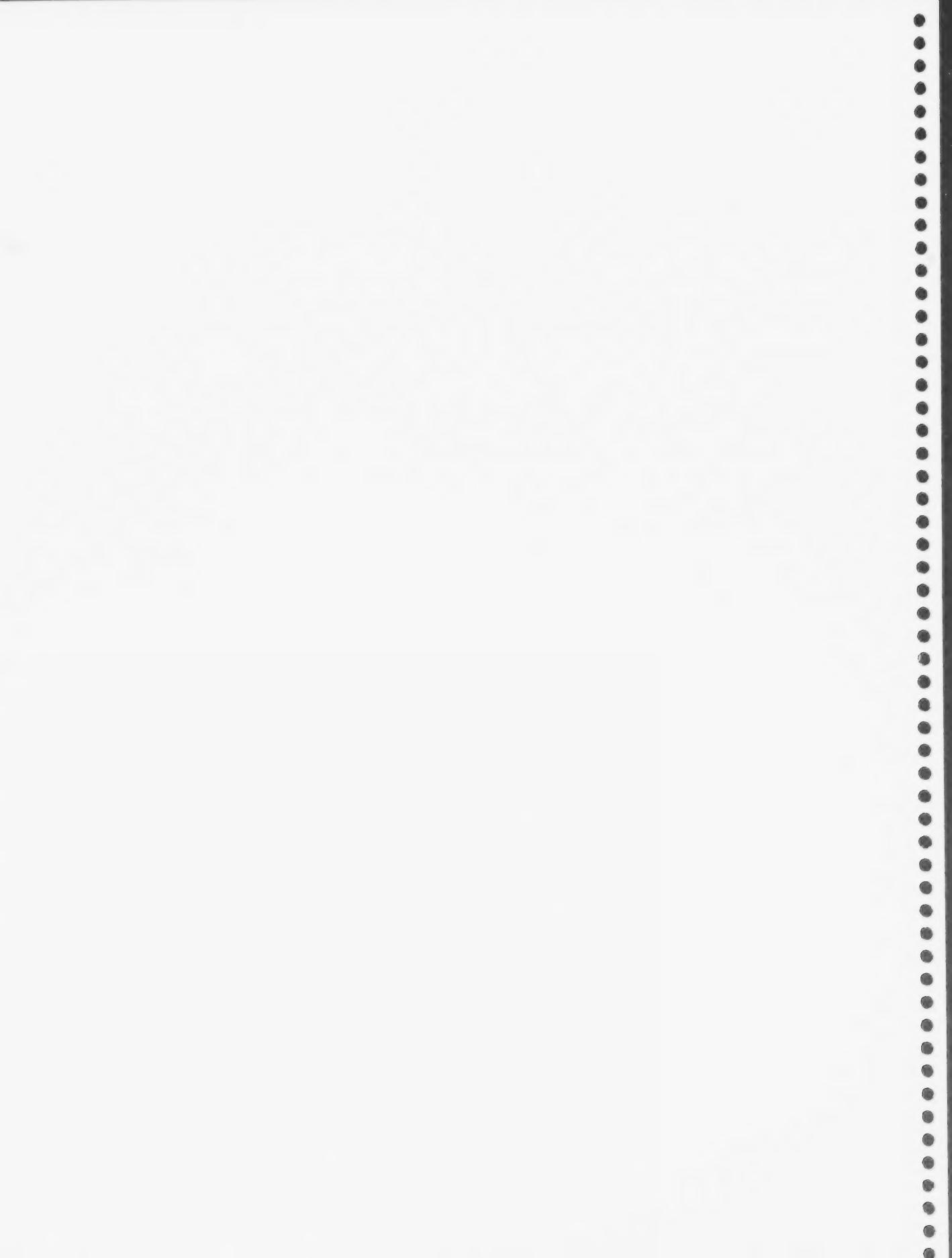
The Purpose of the audit is to assess

- compliance with the *Crown Forest Sustainability Act*,
- compliance with the Forest Management Planning Process,
- a comparison of planned versus actual forest management activities,
- the effectiveness of forest management activities in achieving audit criteria and management objectives,
- assess the effectiveness of previous audit action plans, and
- where applicable, a licensee's compliance with the terms and conditions of the Sustainable Forest Licence.

The eight-member audit team will evaluate forest management planning and practices such as harvest operations, forest renewal activities, road construction and maintenance as well as opportunities for public input and First Nations consultation. The main objectives of the audit are to assess compliance with provincial laws and regulations as well as comment on the effectiveness and sustainability of forestry activities on the management unit.

In addition, the independent forest audit provides an opportunity to improve Crown land management in Ontario through adaptive management. The audits are conducted by consultants that are independent of the Ministry of Natural Resources and the companies being audited, and firms are selected in an arms-length process by the Forestry Futures Committee of Ontario.

**Appendix G**  
**Public Notification**



## Public Notification

**ARMSTRONG FOREST ~ LAKE NIPIGON FOREST  
INDEPENDENT FOREST AUDITS**

KBM Forestry Consultants Inc. of Thunder Bay, Ontario has been retained by the Ontario Ministry of Natural Resources to conduct an Independent Forest Audit, consistent with the Crown Forest Sustainability Act, on the management of the Armstrong Forest & the Lake Nipigon Forest. The purpose of the audit is to assess forest management activities within the Armstrong & Lake Nipigon Forests during the five-year audit period from April 1, 2001 to March 31, 2006. Specifically:

- compliance with the Crown Forest Sustainability Act;
- compliance with the Forest Management Planning process;
- a comparison of planned versus actual forest management activities;
- the effectiveness of forest management activities;
- the effectiveness of previous audit action plans; &
- compliance with the terms and conditions of the Sustainable Forest Licence.

**You are invited** to comment on forest operations on the Forests for this period of time. Please provide your comments by **FRIDAY, JUNE 2, 2006**, directly to the relevant Local Citizens Committee:

<b>Armstrong Forest LCC</b>	<b>Nipigon Area East LCC</b>
Diane Laybourne, Chair	Betty Jean Brill, Chair
P.O. Box 24	RR #1
Armstrong, ON P0T 1A0	Nipigon, ON P0T 2J0
Tel: (807) 583-2080	Tel: (807) 887-2617
Email: <a href="mailto:aardc@tbaytel.net">aardc@tbaytel.net</a>	Email: <a href="mailto:ravenart2003@yahoo.com">ravenart2003@yahoo.com</a>

The privacy of information given to the LCC may not necessarily be protected.

**Alternatively, comments can be sent directly to:**

Ms. Terri Dawyd  
KBM Forestry Consultants Inc.  
349 Mooney Avenue  
Thunder Bay, ON P7B 5L5  
Tel: 807-345-5445 ext. 233  
Fax: 807-345-5858  
Toll Free: 1-800-465-3001  
Email: [tdawyd@kmb.on.ca](mailto:tdawyd@kmb.on.ca)



All correspondence sent to KBM is strictly confidential.

For more information or to download and complete our public audit survey, please visit: [www.kbm.on.ca](http://www.kbm.on.ca)





